ANNALS *of* SURGERY

VOL. LX OCTOBER, 1914 No. 4

PRINCIPLES OF OPERATIVE TREATMENT OF THE DISEASES OF THE LARGE INTESTINE*

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THE operative treatment of the diseases of the large intestine is still far from being perfect. The number of unsolved problems here is a considerable one, and is due to two reasons: First, though the application of the operative treatment of these cases is becoming wider with every day, the indications for the adoption of one or another method of treatment is not sufficiently settled yet. To prove this I may mention the treatment of *megacolon congenitum, colitis,* and that of *volvulus.* Second, the methods of anastomosis and of resection of the large intestine themselves have still to be more carefully investigated and improved.

RESECTIONS

Nature of disease	Parts affected	Extent of resection	Cases	Deaths
Carcinoma.....	Stomach and transverse colon	Stomach and transverse colon	3	3
Carcinoma.....	Cæcum	Cæcum and ascending colon	2	1
Carcinoma.....	Colon descendens:			
	(*a*) without obstruction	Part of colon descendens	1	0
	(*b*) with obstruction	Part of colon descendens	1	1
	(*c*) with obstruction and peritonitis	Part of colon descendens	1	1
Carcinoma.....	Transverse colon and fecal fistula	Transverse colon	1	1
Sarcoma.....	Sigmoid	Sigmoid	1	0
	Cæcum	Cæcum	1	1
Tuberculosis.....	Cæcum	Cæcum and colon ascendens	3	0
	Hepatic flexure	Cæcum and colon ascendens	1	0
	Sigmoid, colon descendens and transverse	Sigmoid, colon descendens and transverse	1	0
Inflammatory tumor	Cæcum	Cæcum	1	0
Fecal fistula.....	Ileum	Ileum, cæcum and ascending colon	1	0
Colitis.....	.....	Transverse colon	1	0
Colitis.....	.....	Descending colon	1	0
Intussusception.....	Cæco-iliac	Ileum, cæcum and colon ascendens	1	0
			21	8

*Translated from the Russian by G. de Swietochowoski, M.D., M.R.C.S., of London.

It is a fact that the literature which deals with these problems is very extensive; to give a full account of it would, therefore, unduly complicate my present task. I think it will be more to the purpose if I confine myself to my own observations chiefly, quoting only such facts from literature which seem to me both interesting and important. Without making a review of such minor operations as colopexies, colotomies and closing of fistulæ, I shall here mainly discuss such bigger operative measures as resections and exclusions.

It appears from the foregoing figures that resections of the stomach, when combined with those of the colon, end fatally. According to my observations and to those of other authors, it is usually some such place as a loop of the duodenum, or a loop of the large intestine, that is the origin of infection, thus being the cause of death, which often follows such extensive operations.

My own experience and that of others makes me rather inclined to count among inoperable cases such patients, who, owing to the spread of the cancer, would require a resection of the transverse colon as well as that of the stomach. The reports of Perthes, however, restrain me from passing such judgment. Perthes lost only one out of four similar cases; the other three have enjoyed good health for a considerable period after the operation.

The above figures show also that both of the two patients, who underwent resection of the bowel on account of symptoms of obstruction, died, the situation in one of them being, moreover, complicated by perforative peritonitis. Barring these five cases just mentioned, 16 cases of resection of the large bowel remain out of the total of 21, with but three deaths.

EXCLUSIONS

Nature of disease	Extent of resection	Cases	Deaths
Carcinoma of the stomach and transverse colon and fecal fistula	Gastro-enterostomy, posterior, ileo-sigmoidostomy	1	1
Carcinoma of descending colon and carcinomatous peritonitis	Ileosigmoidostomy	1	1
Fecal fistula, tuberculous cæcum	Ileotransversostomy	1	1
Fecal fistula, ileum (cæcum?)	Ileosigmoidostomy	1	1
	Ileotransversostomy and division of ascending colon	1	1
Fistula sterc. vag. ileum	Ileotransversostomy	1	0
Tuberculosis of cæcum	Ileotransversostomy	1	0
Kinked hepatic flexure	Ileotransversostomy	1	0
Ulcerative colitis	Ileosigmoidostomy	1	1
Chronic mucomembranous colitis	Ileosigmoidostomy	3	0
Fecal fistula of transverse colon	Ileosigmoidostomy	1	0
	Division of transverse colon	1	0
Non-malignant obstruction of splenic flexure	Transversosigmoidostomy	6	0
		20	6

We pass now to the intestinal exclusions.

Thus, having excluded minor operations such as colotomies, artificial anus, fistulæ and colopexies, I have at my disposal a material of 41 cases, in which I performed more serious operations on the large intestine. There is not much object in adding up here the percentage of deaths; because, owing to the great variety of cases, an average figure of mortality would not tell us anything. The figures quoted above relate to operations which the author had personally performed up to June 11, 1913.

However diverse may be the diseases of the large intestine which necessitate one or another surgical intervention, the operations themselves present here a certain similarity. This, however, does not mean yet that all the operative measures were to be called identical. By no means! But, on the other hand, there is no doubt whatever that the same therapeutic measures are often applied in different complaints. This can easily be proved by considering for a moment the treatment of such different cases as congenital megacolon, ulcerative colitis, carcinoma and volvulus of the large intestine.

In cases of congenital megacolon the treatment consists of coloplication, colofixation, artificial anus, entero-anastomosis and resection of the sigmoid.

For ulcerative colitis we perform colostomy, ileosigmoidostomy, and resection of the bowel. In carcinoma we have again resection, entero-anastomosis, fixation, artificial anus, and invagination, which has lately been recommended by I. I. Grekoff, and which, though for some other reason, was introduced 12 years ago by Prof. S. P. Fedoroff. Leaving out colopexy, whatever case we may have to deal with, we appear to revolve mainly round the three operative possibilities: resection, entero-anastomosis, and colotomy. These three operations will now be considered a little more closely.

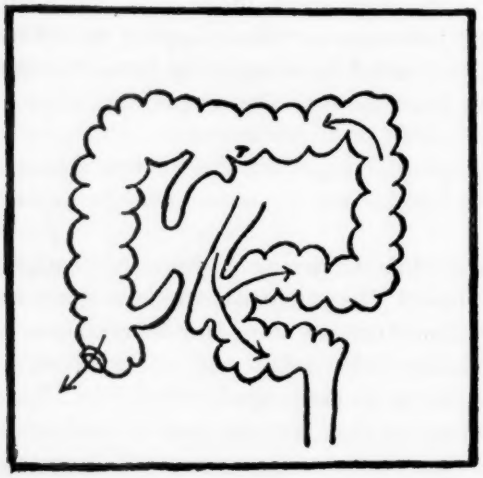
Up to quite recently we used to make a strict difference between a partial unilateral, a complete unilateral, and a complete bilateral exclusion of the large intestine. To simplify my task I shall leave aside the first mentioned method, and shall only consider here the second one, the so-called unilateral exclusion of the large intestine, effected by means of ileocolostomy and division of the distal portion of the ileum.

In my work on the principles of operative treatment of fecal fistulæ, I quoted a case of a tuberculous fistula of the cæcum on which I had to operate twice: First, I performed ileocolostomy (transverse colon) with division of the ileum, and afterwards an ileosigmoidostomy; also with

division of the ileum. The final result is depicted in Fig. 1. The operation did not cure the fistula, because the fæces began to pass in a reverse direction through the large intestine, and came out through the fistula. Soon afterward I operated on another patient who suffered from an otherwise incurable chronic colitis; in this case the pains which had temporarily abated after ileosigmoidostomy had been performed returned later on. And when finally colotomy was performed, the motions passed through the opening.

Based on these facts, and aided by the case of Prof. S. P. Fedoroff, I came to the conclusion that in order to cure a fecal fistula of the large intestine by means of an anastomosis, it is necessary to have recourse to a complete bilateral exclusion; and that extensive unilateral

FIG. 1.



exclusions are insufficient, because the contents of the bowels return through the large intestine to the fistula.

However, the statements of other authors on this subject made me doubtful of the correctness of my conclusion, and especially the investigations of Roith seemed to me very convincing. According to his views the transverse colon in its left two-thirds, as well as the descending colon, is not capable of performing any antiperistaltic movements, at least not as a rule; thus no fæces can pass along those sections of the bowels in a reverse direction.

Owing to the importance of this investigation, I felt justified in counting my cases among the "exceptions," and in trying ileosigmoidostomy once more. Following my own method (consisting of three stages) I resected in one of my cases the cæcum and ascending

colon, which were both affected by carcinoma; in consequence of this the patient developed fistulæ of the transverse colon and of the ileum, which would not heal, in spite of my having attempted three times to close them by means of a suture.

I then had recourse to ileosigmoidostomy with division of the proximal portion of the ileum; two or three days after the operation, fæces appeared again through the fistula of the transverse colon. Thus we have the old complication of the retrograde movement of the contents along the large bowel repeated all over again. I now divided the transverse colon at the splenic flexure, thus converting the fæcal fistula into a mucous one. The result of this operation is demonstrated in Fig. 2. A year and a half later I saw the patient again; his mucous

FIG. 2.

fistula did not inconvenience him much, he looked exceedingly well, and was free from all complaints.

This case proves that in patients suffering from a fistula of the colon even an ileosigmoidostomy is accompanied by a reversed peristalsis of that part of the large intestine. Hence it follows that in these cases the so-called complete unilateral exclusion is inapplicable for the simple reason that it does not really exclude anything. The latest investigations of Kopiloff have confirmed the above statement.

One might imagine that the presence of a fistula in the large intestine predisposes to a reversed current of the intestinal contents, and that the fæces are propelled even by a normal peristaltic wave toward the point of least resistance, that is, toward the fistula. One might

also think that if there were no fistula there would be no such movement; and that *per se* the so-called unilateral exclusion is applicable to cases in which there is no fistula, and where there is also no organic hindrance to a free passage of the intestinal contents, as, for example, is the case in colitis. However, the facts relating to the above mentioned disappoint us more with every day.

After a complete unilateral exclusion, no matter whether such exclusion was effected by means of a communication between the ileum and the transverse colon, or by means of ileosigmoidostomy, the part of the colon thus excluded forms a cul-de-sac which accordingly varies in length. It also appears that this sac can by means of a retrograde peristaltic movement fill up with fæces and thus cause serious trouble. Grekoff has mentioned a case in which an accumulation of fæces in the cæcum after an exclusion led to a perforation, and caused the death of the patient. De Quervain informs us that, in consequence of an accumulation of fæces, he had twice to resect the cæcum and the ascending colon, following an anastomosis between the ileum and transverse colon. Franke, formerly an ardent advocate of ileosigmoidostomy, has lately begun to talk about the dangers of antiperistaltic movements of the large intestine.

Quite recently, von Beck stated that out of his 32 cases which underwent ileosigmoidostomy owing to chronic colitis, pericolitis, and also owing to an unsatisfactory position of the large intestine, six cases, in the course of time, developed intestinal stasis in the excluded cul-de-sac.

Thus, one fact after another points out emphatically how very relative the value of the complete unilateral exclusion is, even in cases where there is no fecal fistula. The formation of cul-de-sacs out of portions of the large intestine apparently brings with it the well-defined danger of the overflow of its contents, and consequently of perforation.

We involuntarily turn our mind now to the formation of cul-de-sacs in connection with other operative measures, such as resections and complete exclusions. Their number is large enough to justify a more detailed consideration, and we have to make now an attempt to explain their origin and their significance.

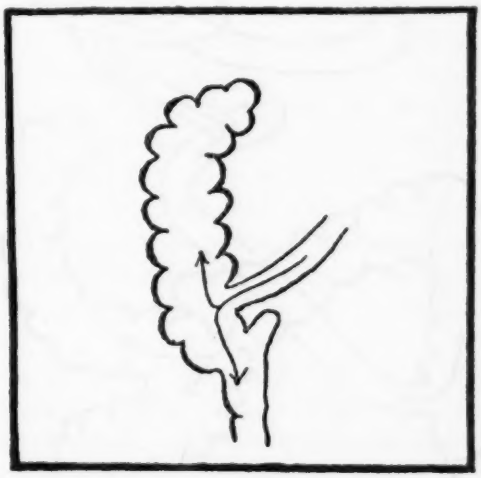
Above I quoted a case where ileosigmoidostomy was performed in consequence of a fecal fistula of the transverse colon, and in which that part of the large intestine was divided just to the right of the splenic flexure (Fig. 2). It is obvious that this patient developed a cul-de-sac extending from the splenic flexure to the top of the sigmoid.

Within a year and a half from the date of the operation he did not show any abnormal signs, no overflow of fæces being noticeable.

However favorable this result may have been, and may prove itself in the future, such a position of affairs is unfortunately not the rule, but an exception. Lane, who now removes the large intestine in cases of "habitual" constipation, in the beginning used to divide the transverse colon at the splenic flexure after ileorectostomy. Some time after, his patients complained of symptoms which had to be referred to a distention by gas of the sigmoid and that of the descending colon, that is, of the cul-de-sac. For this reason Lane began to resect the whole of the large intestine.

I had to operate several times on a (female) patient for a severe

FIG. 3.



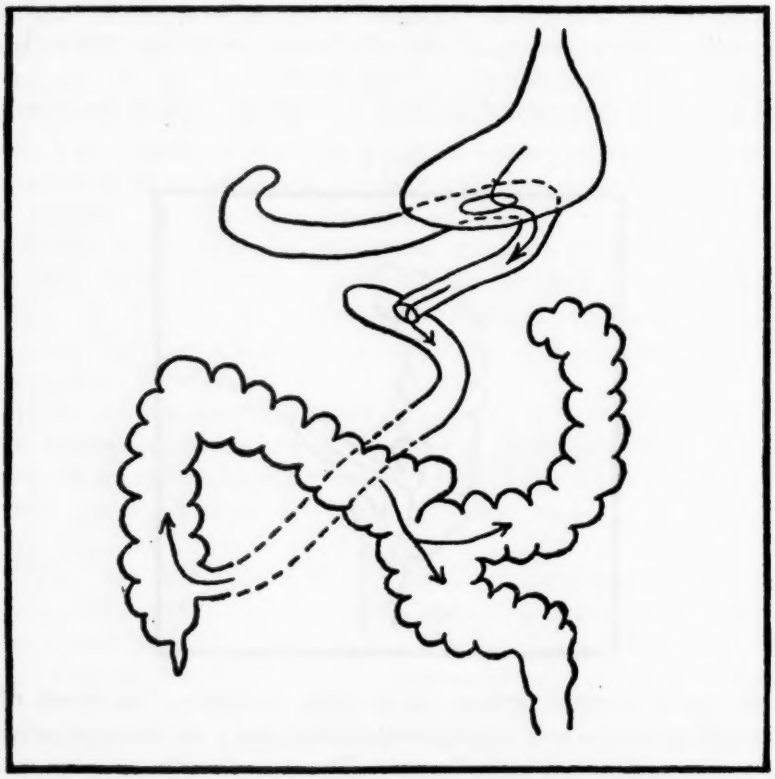
colitis, which I might perhaps term *colitis dolorosa*. The result of a series of operations was: ileosigmoidostomy, and a cul-de-sac which led upward toward the splenic flexure. The pain in this sac was so intractable that I was obliged to establish a fistula at the basis of the upper portion of the sigmoid.

The cases just analyzed have not exhausted our subject yet, since the most common cause of the formation of cul-de-sacs appears to be the resection of the transverse colon.

In one of my cases, a (female) patient of twenty, I had to remove the whole of the sigmoid flexure, the descending colon and the left two-thirds of the colon transversum, the reason for the operation here being multiple tuberculous strictures of the large intestine. As there

was no possibility of bringing the end of the remains of the colon transversum and the pelvic colon together, I had to close both ends of the bowel, and, having removed the appendix, I united the cæcum with the pelvic colon by means of a lateral implantation (Fig. 3). Some time after, signs of stasis appeared in the cul-de-sac thus formed: griping pains, distention and peristaltic movements of the blind portion of the bowel. Having noticed this, I established a fistula of the ascending

FIG. 4.



colon, as it was obvious that the blind pouch was overfilled with fæces.

Studying the literature on this subject, I came across a description of a case of Haberer, who, having performed resection for carcinoma of the stomach and transverse colon, thought lateral anastomosis necessary between the cæcum and the sigmoid. This patient died of perforation of the ascending colon.

As a parallel case to the one just described, I might quote a case of my own, in which, owing to a *carcinoma ventriculi*, I had to resect

a part of the stomach, a portion of the jejunum and a part of the transverse colon. However, I am not going to describe this operation in detail, as Fig. 4 diagramatically shows the result. Here again a cul-de-sac had formed out of the descending colon. In spite of the ideal healing of all internal sutures, which, in fact, were very numerous, the patient died of exhaustion, within a fortnight, an abscess having also formed in the vicinity of the descending colon.

Considering now more closely all that has been said before, we find that even comparatively short cul-de-sacs of the large intestine are very troublesome, since they favor fecal stasis and predispose to perforation, thus sometimes rendering either a resection or a fistula inevitable. All these blind sacs represent nothing else but unilaterally excluded and comparatively short portions of the colon.

Clinical observations of what I might term the operative formation of cul-de-sacs of the large intestine are published as single cases, and the picture of the unfavorable effect of these structures is still but a very dim one at present. And it is still rather difficult to pronounce the effect of such cul-de-sacs as absolutely unavoidable. So much so, that in order to obtain a clear explanation of this question I was obliged to have recourse to an experiment. With clinical facts to start with, one can sketch out a whole series of imaginary cul-de-sacs, and one can study all their variations on animals. A series of such suggestions, as those on Fig. 5, I proposed to Dr. A. A. Perlman for experimental investigation.

Up till now we have discussed that group of cases in which there were no hindrances to a free passage of the intestinal contents throughout the distance between the site of the anastomosis, such as ileosigmoidostomy, and the top of the blind end of the gut: be it in the cæcum, hepatic flexure, or splenic flexure. Consequently, it is necessary to consider now also that category of cases in which there is a narrowing of the large intestine of some kind or other.

It is sufficient to glance at Fig. 6 in order to arrive at the conclusion *a priori* that ileocolostomy can be adopted only in cases of an affection of the cæcum; because a real narrowing of its lumen will interfere with the backward progress of the fæces. In all other cases, should no return of the fæces occur after ileosigmoidostomy, then the secretions of the intestine will accumulate in the proximal section of the gut, and the cul-de-sac will again be distended. As a matter of course, this problem also requires experimental investigation, and V. N. Nazaroff, following my suggestion, set to work to tackle this question.

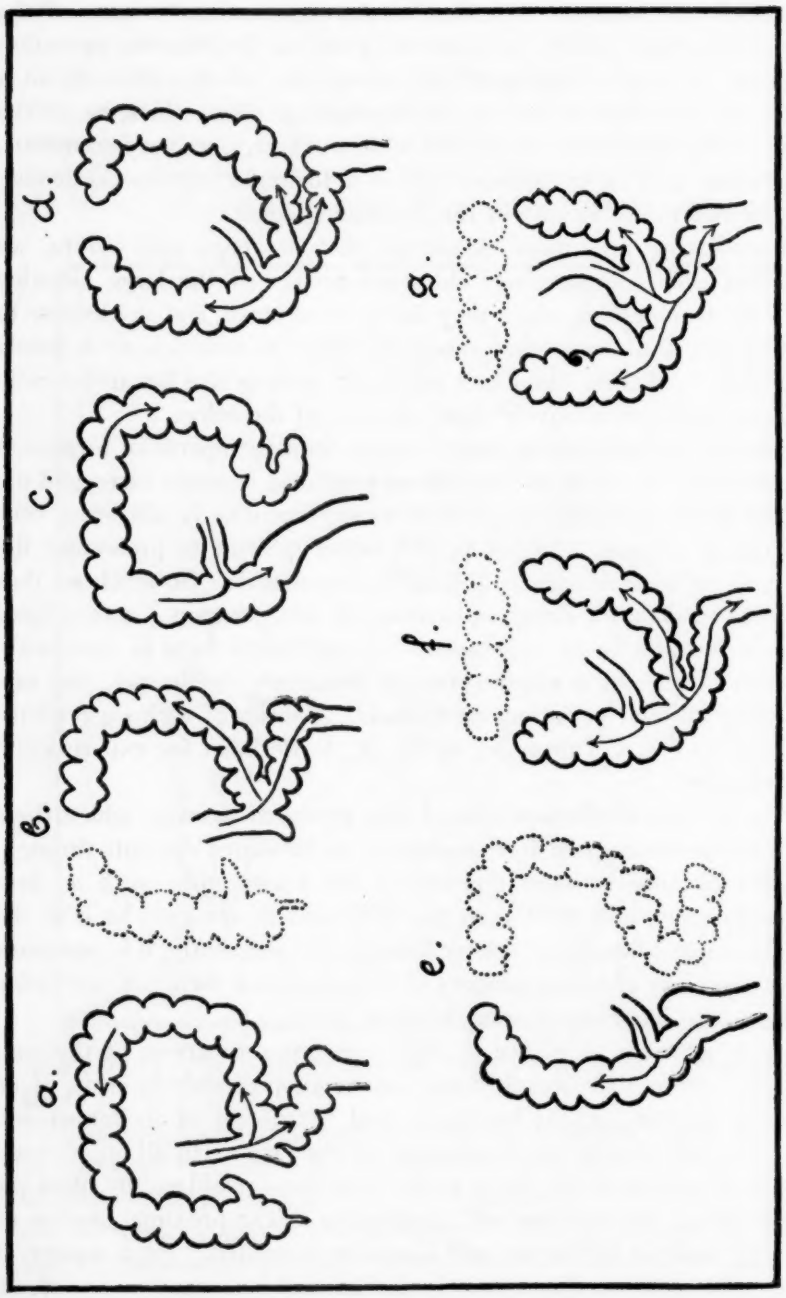


FIG. 5.—The dotted lines define the parts to be resected.

I have considered the so-called complete unilateral exclusion more fully because of its great importance. Whatever we do, whether a complete bilateral exclusion or a resection of the large intestine, we should, as far as possible, avoid the formation of cul-de-sacs. Should they be inevitable, and should we on purpose desire to perform ileo-

FIG. 6.

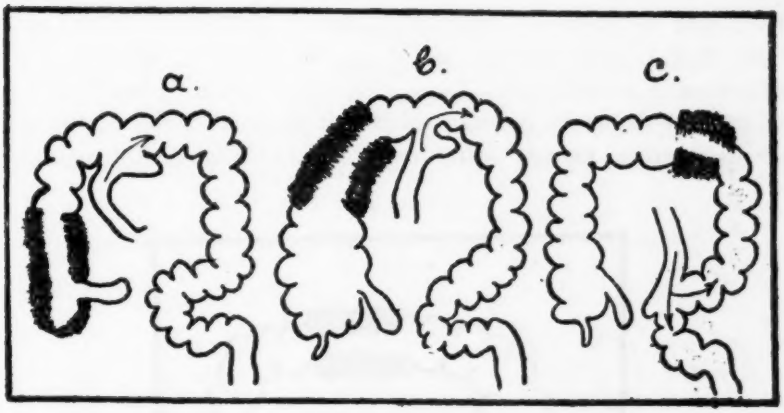
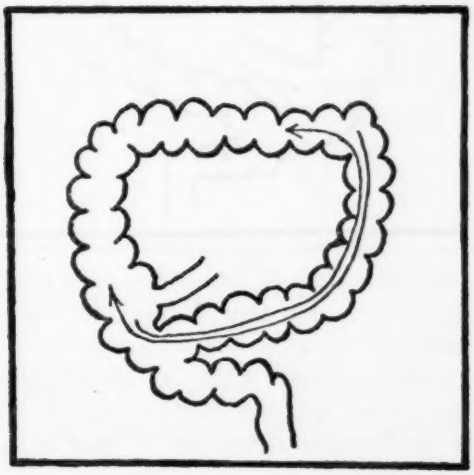


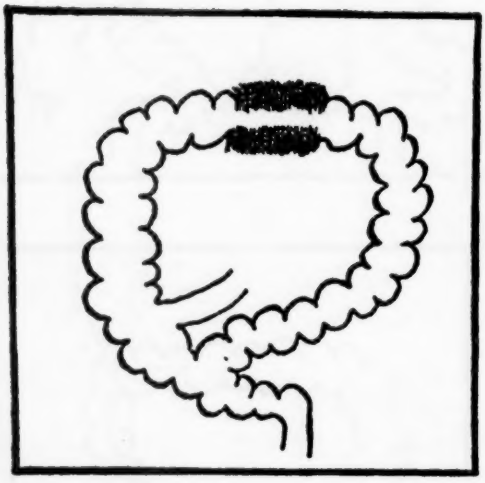
FIG. 7.



colostomy, then such exclusions ought to be combined with a fistula at the top of the cul-de-sacs. I shall presently come back to the discussion of all these questions. Meantime, considering that ileocolostomy without complementary measures has an extremely narrow application, I should like to finish the subject of extensive unilateral ex-

clusions of the large intestine in which the exclusion is not accompanied by any formation of a cul-de-sac. I am speaking here of Giordano-Bergmann's operation. This consists of establishing an anastomosis between the top of the cæcum and the sigmoid. As it is known, Bergmann recommended this operation as a treatment of volvulus of the sigmoid. At the first sight it may appear that such an exclusion enables the cæcum to empty its contents straight into the sigmoid, and thence into the rectum. However, a closer investigation of this matter shows that Giordano-Bergmann's operation creates nothing but an endless colon in which the fæces move in a circle. Indeed, cæcosigmoidostomy draws both guts together, it closes the ring of the colon, and, to a certain extent, owing to the fixed position of the sigmoid, it

FIG. 8.



interferes with the discharge of fæces *per vias naturales*. Looking now at the circle of the colon thus formed, we shall see that every peristaltic movement will drive the intestinal contents in either direction.

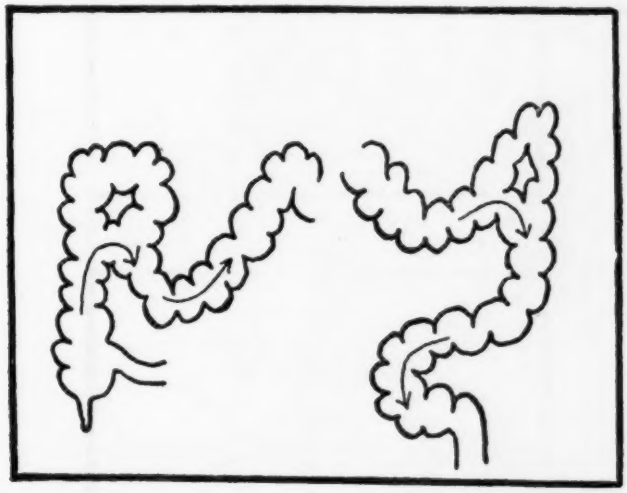
In practice I came in contact with Giordano-Bergmann's operation in a female patient suffering from *colitis dolorosa*. Koerte, thinking that the pains in the large intestine were caused by pericolitis of the hepatic flexure, performed cæcosigmoidostomy. I must add, that this case was an exceptionally severe one; I was not able to cure her in spite of a series of consecutive operations; Giordano-Bergmann's operation, however, had undoubtedly aggravated her condition.

Let us assume for a moment that we had a case in which there really was an obstruction of the intestine, either at the hepatic flexure,

or in the middle of the transverse colon. Giordano-Bergmann's operation would in such a case produce two cul-de-sacs at a time (Fig. 8). After all that has been said about single cul-de-sacs, the establishment of two cul-de-sacs will hardly appear desirable! Even the extent of the exclusion of the intestine does not influence Giordano-Bergmann's operation for the better; since, as we have seen, the larger the exclusion made, the worse the results; a vicious circle is established in the large intestine, and two cul-de-sacs on top of that.

Together with a complete unilateral exclusion there existed for a long time the partial unilateral exclusion, better known under the name of entero-anastomosis. It is hardly necessary to say that this latter operative measure is not applicable in the treatment of certain

FIG. 9.



troubles, such as, for example, fecal fistula and colitis. Its application is mainly limited to obstructions of the large intestine, mostly of a non-malignant character; here belong pericolitic contraction, kinks of the large intestine, as well as benign strictures. In fact, under such circumstances entero-anastomosis forms a short circuit round the hindrance; and the more economically it is being done in these cases, the more, apparently, satisfactory are its results.

At any rate, this holds good with regard to cases where hepatic and splenic flexures of the colon are kinked or contracted. Payr and others have successfully adopted colocolostomy between the transverse colon on the one hand, and the ascending and descending colon on the other, in cases of movable or dropped transverse colon. I maintain

that this type of operation (Fig. 9) is satisfactory, because it does not leave any cul-de-sacs behind it.

To this kind of operative measures belong sigmoidorectostomy, performed in cases of megacolon of the sigmoid (5 recoveries out of 7

FIG. 10.

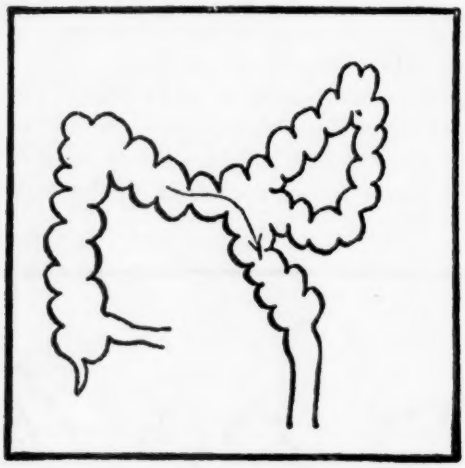
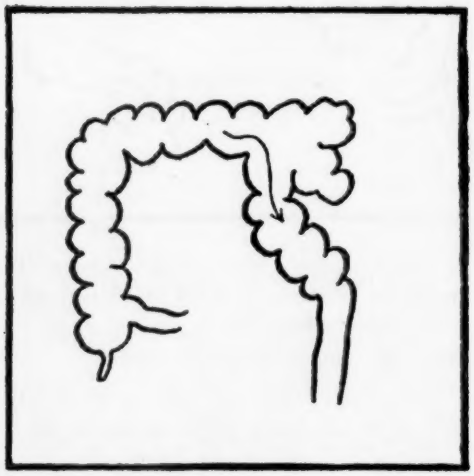


FIG. 11.



cases), and, finally, the Troyanoff-Winiwarter anastomosis between the loops of the sigmoid at the site of its flexure.

An economical exclusion proves to be sometimes impossible in consequence of the anatomical position of the large intestine, and we are

bound to adopt more extensive exclusions in these cases. Transversosigmoidostomy (Fig. 10) will play the chief rôle in the exclusions of the left half of the colon, ileotransversostomy applying to the right half.

I had to perform transversosigmoidostomy 6 times for different reasons. One (female) patient died, in whom the sigmoid flexure was rather short, though it was easily brought together with the transverse colon. Two days after the operation I had to perform another laparotomy, because of an obstruction of the small intestine; I found that the comparatively short mesosigmoid formed a fulcrum on which a loop of

FIG. 12.

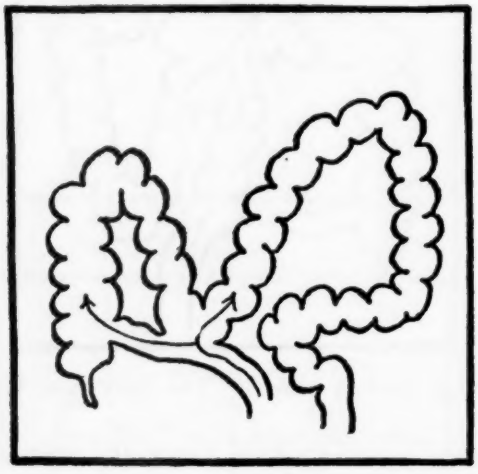
the small intestine became kinked. The operation, however, did not save her life.

The remaining 5 patients have borne the operation quite satisfactorily. One of them has felt perfectly well during the 5 years following the operation, having been under my observation all that time. In another patient, within a year's time, I resected the large intestine, beginning with the splenic flexure, and ending with the anastomosis of the sigmoid, in order to cure colitis. Afterwards Prof. N. N. Petroff, in Warsaw (within a few months), performed another operation on the same patient, because of a contraction of the communicating opening.

The three remaining patients felt considerable improvement after the operation. Two of them I lost sight of, the third one, suffering from tuberculosis of the descending colon, showed himself to me from time to time, but, having definite symptoms of a lung trouble, he most likely perished from tuberculosis.

As it may be seen, for example, from Fig. 10, an excluded ring of the large intestine is formed in consequence of transversosigmoidostomy. Should we imagine that in the corner of the splenic flexure arises some hindrance for the free passage of the intestinal contents, then again we have to face the question of cul-de-sacs. I think, however, that one cannot identify the type of cul-de-sac following transversosigmoidostomy with the cul-de-sac resulting from ileocolostomy, which is carried out with a division of the distal portion of the ileum. They would become identical then, when to the transversosigmoidostomy were added the division of the transverse colon beyond the anastomosis (Fig. 12). In the absence of such division, transversosigmoidostomy does not interfere with the passage of fæces through the site of obstruc-

FIG. 13.



tion, and it empties the proximal portion of the transverse colon. In this manner the continuity of the peristalsis must counteract the accumulation of fæces in the descending colon. At any rate the descending colon, which was resected by myself within a year after I had performed transversosigmoidostomy, was neither dilated nor overfilled.

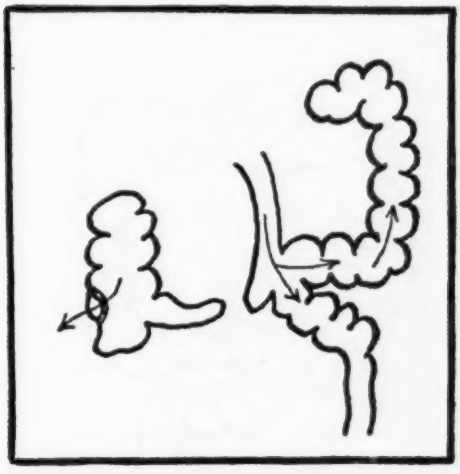
To confirm all that has been said above, I shall quote one more case. This was a patient in whom the right half of the transverse colon formed a loop hanging down as far as the pelvis. The patient suffered from obstruction and pain in the region of the ascending colon. As I intended to empty the cæcum and the ascending colon, I performed ileotransversostomy (Fig. 13) without dividing the distal ileum. I saw the patient several times after, and even operated on him twice for some

other reasons; the obstruction and the pains, however, have not been complained of any more.

Thus, the partial unilateral exclusion may well be considered a successful means of emptying the proximal portion of the gut in cases of obstruction. At any rate, where we can choose between a complete unilateral and a partial unilateral exclusion, preference should be given to the latter. An exception is made for the strictures of the cæcum, in which case ileotransversostomy with a division of the ileum must be preferred to an ileotransversostomy without a division of the distal ileum.

Entero-anastomosis undoubtedly cannot always replace complete exclusions. As, however, complete unilateral exclusion in reality does

FIG. 14.



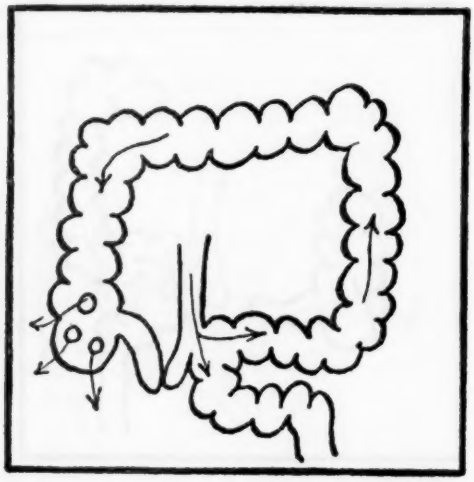
not exclude anything, there remains only the so-called complete bilateral exclusion. The application of the latter is considerably wide. On the one hand, this method may be adopted as a preliminary step towards the resection of the large intestine, and, on the other hand, as a final measure, where resection is either impossible or inadvisable. The simplest example of the application of the complete bilateral exclusion is seen in fistulæ of the large intestine. A fæcal fistula is converted into one which discharges mucus, the presence of the fistula securing a free discharge of the contents from the excluded bowel. The therapeutic value of such a fistula is beyond all doubt.

In the beginning I mentioned a case in which I performed a complete bilateral exclusion of the transverse colon. A year and a half later this patient did not any more want to run the risk of a resection

of the excluded bowel, because his mucous fistula did not inconvenience him much.

The following case is still more instructive. I have already spoken of a patient suffering from *colitis dolorosa*. The following was the result of this very difficult operation which consisted of resection of the transverse colon and of the upper portion of the ascending colon, and of an abolishing of an anastomosis between the cæcum and the sigmoid (Fig. 14). On the right side the cæcum and the remains of the ascending colon were bilaterally excluded, being supplied with a fistula which had been there for some time. After the operation the pains in the descending colon were so great that, as I have already said, I was obliged to establish a fecal fistula. The portion of the

FIG. 15.



large intestine which was bilaterally excluded remained completely painless and sound.

We see, therefore, that in performing bilateral exclusions of the large intestine in order to cure fistula, we have to consider: first, how to do it as economically as possible; and second, how to avoid the formation of a cul-de-sac from the remains of the large intestine.

I should like to give an example in order to explain the above assertion. I mean a case which after a gangrenous appendicitis developed several fecal fistulæ in the right iliac fossa. Those surgeons who operated on this patient on account of his fistulæ apparently had no doubt whatever (myself included) that these were fecal fistulæ of the cæcum. The last operation performed previous to mine, consisted of ileosigmoidostomy, and of a ligature applied to the distal

portion of the ileum (Fig. 15). The escape of fæces through the fistula, however, had not ceased. This might have been explained, either by being due to the ligature having become patent to the intestinal contents, or to a retrograde movement of the fæces, or, more correctly, due to both. In order to do away with this symptom I decided to undertake bilateral complete exclusion of the cæcum and ascending colon, to resect the site of the ligature, and I contemplated the division of the ascending colon at the hepatic flexure. This, however, would leave a long cul-de-sac behind. To avoid the formation of the latter I began the operation by performing ileotransversostomy, the result of which is seen on Fig. 16. It follows, that after the opera-

FIG. 16.

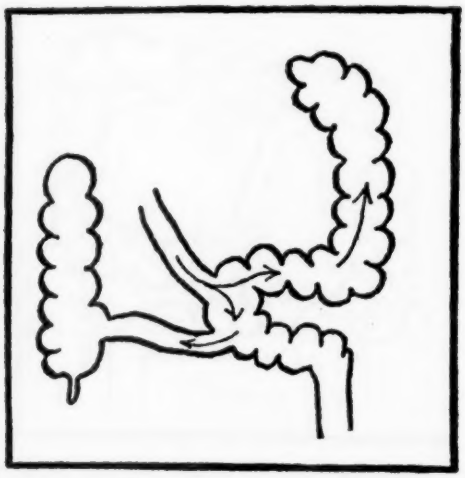
tion the small intestine discharged itself into the large intestine at two places, and above all, the cul-de-sac was abolished. In spite of all that, the operation did not prove successful: the fistulæ continued to discharge fecal matter; the presence of a communication between the rectum, and, apparently, the cæcum was revealed, and I had thus to decide upon resection of the excluded portion of the gut. I shall come back to this subject lower down.

A case of Wiesinger proved conclusively that the complete bilateral exclusion, combined with a ligature of both ends of this excluded gut, and leaving it in the abdominal cavity, is an operation which is not practicable. In Wiesinger's case the excluded large intestine, overfilled with mucus, perforated, causing death 13 years after the operation. Hence every bilateral exclusion, whatever may be its object, must

necessarily be accompanied by the establishment of a fistula of the excluded portion of the gut. It is easy to imagine a case of complete exclusion done in dealing with a carcinoma, tubercle or colitis, and it is easy to imagine the process of establishing a fistula. It is, however, somewhat difficult to see one's way clearly with regard to those cases, where the complete bilateral exclusion appears to be a part of the result of the resection of the large intestine.

Previously, the formation of cul-de-sacs was discussed as a sequel to resections of the large intestine. Now it appears that the resection of the colon gives rise to a formation of cul-de-sacs blind at *both* ends. As an illustration may serve here Montprofit's operation, which divides the ileum and implants both proximal and distal ends of this gut into

FIG. 17.



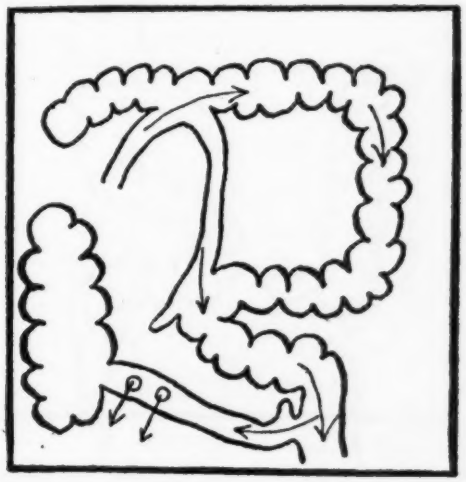
the sigmoid (Fig. 17). The afferent portion of the ileum has to empty the small intestine, and the efferent, the cæcum.

Dr. Katchanoff studied Montprofit's operation, and, in my opinion, correctly arrived at the conclusion, that the ileocæcal valve prevents the cæcum from being emptied. Katchanoff's conclusion was based on his observation of a case of a (female) patient on whom Prof. Fedoroff carried out Montprofit's operation, and on whom later on I had to perform another laparotomy on account of peritonitis. The latter originated in a loop of the ascending colon, the cæcum and the ascending colon being extremely distended by gas.

At the present moment I should like to complete the discussion of Montprofit's operation, and I shall therefore turn now to the description

of the case I have just been talking about, the patient with the fecal fistulæ. The resection which was undertaken proved that the fistulæ related to the excluded part of the ileum, and that between the latter and the pelvic colon there was a communication. The cæcum and the ascending colon were highly distended, and packed with fecal masses (Fig. 1). It is clear that the foregoing operation put the cæcum and the ascending colon into the position of complete bilateral exclusion. The ileum communicating with the rectum was not able to empty the cæcum. Through a coincidence this operation turned out to be identical with Montprofit's operation. Six months after the operation

FIG. 18.



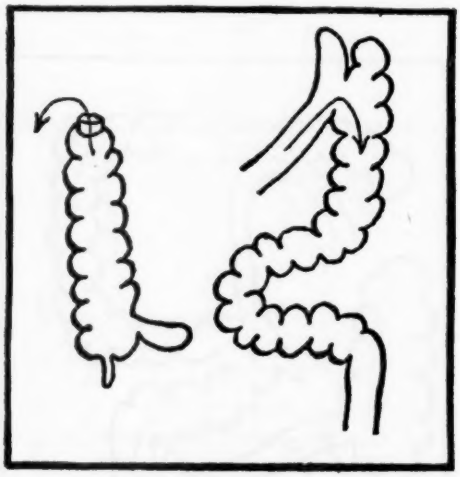
the excluded portion of the large intestine was found overfilled, that means, on the best way to perforation.

In the face of the above quoted facts it appears to me, that it is time to give up Montprofit's operation as an impracticable one. And yet, when it becomes impossible to bring both ends of the colon together after a resection, the resulting situation is very difficult indeed. Of course one might resect the ascending colon and cæcum without any deteriorating effect on the patient's health, by implanting the ileum into the left segment of the large intestine. However, the fear of an undue prolongation and complication of this *per se* difficult operation restrain us from doing so. The most practical way out seems to me to be the following plan: to combine ileocolostomy (with the descending colon) with division of the distal ileum. Ileocolostomy is more rational than ileosigmoidostomy, since it prevents the formation of a

cul-de-sac out of the descending colon. On the right hand side is established a mucous fistula of the ascending colon, and the possibility is offered of a subsequent resection of the cæcum and ascending colon (Fig. 19).

At the present moment we have to distinguish between three types of artificially established intestinal fistulæ: (1) Mucous fistula; (2) fecal fistula; (3) artificial anus. It follows from the aforesaid, that the mucous fistula is a direct sequel to complete exclusion, therefore

FIG. 19.



nothing else remains to be said about it. We have only to notice that in a series of cases mucous fistula becomes an alternative to a fecal fistula.

Supposing we ought to resect the whole of the large intestine but, for some reason or other, the condition of the patient did not permit such a measure. In such a case the large intestine may be either excluded unilaterally by means of ileorectostomy or ileosigmoidostomy, a fistula being established at the top of the cul-de-sac (Fig. 20); or a method, which has been particularly favored by De Quervain and also consisting of ileorectostomy or ileosigmoidostomy, is carried out, the difference being here the division of the large intestine just above the anastomosis, its proximal end being brought to the surface, which means a mucous fistula is performed in the excluded bowel.

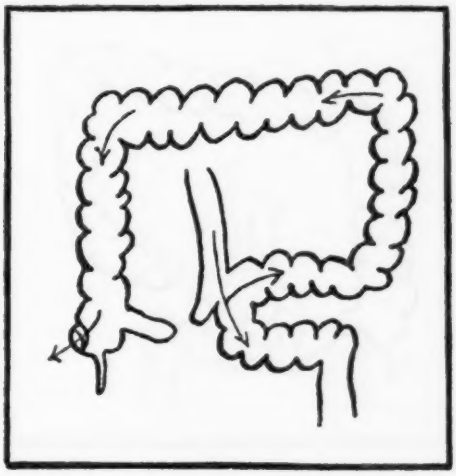
I confess that the question just raised with regard to the choice

of the one or the other of these methods is open to discussion. In one of my cases I preferred to adopt the first method as being simpler and having the advantage of gradually preparing the patient for a subsequently limited function of his large intestine.

Before I close the discussion on mucous fistulæ, I must add that one can distinguish two groups amongst them. First, the temporary ones, when the excluded portion of the large intestine can be resected; second, permanent ones, where no resection can be taken into consideration, as is often the case in neglected cancerous, tubercular and actinomycoid processes.

The grouping of fecal fistulæ slightly differs from the foregoing. Fecal fistula is always temporary or, at any rate, ought to be such; a

FIG. 20.



permanent fecal fistula represents already an artificial anus, which, however, we will discuss separately.

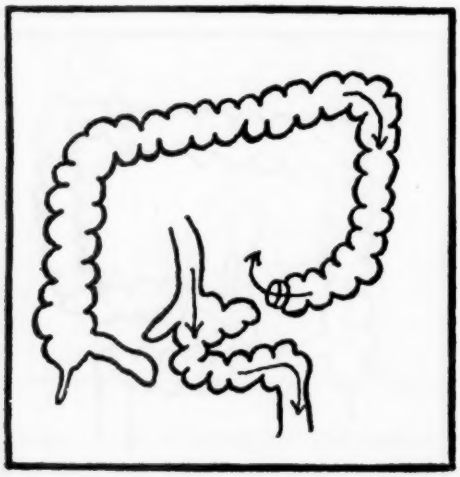
There are two types of fecal fistulæ. The first type is represented by the auxiliary ones, if I may term them thus, which, for example, are established at the end of a cul-de-sac in unilateral exclusions. The second type are fecal fistulæ, which we might term the self-existent ones, applied with the object of treating such conditions as ulcerative colitis and others. I have already spoken about the first type, so that now I shall only consider the second one.

From the typical fecal fistulæ, Weir's appendicostomy deserves special attention, as being very easily performed, and easily managed. Its advantages have also been documented in the Russian medical

literature by Vanahoff and Fedorovitch. At present the application of appendicostomy is limited to cases of severe ulcerative colitis. I made use of appendicostomy as of an additional fistula, immediately after a complete unilateral exclusion of the large intestine. I think, however, that appendicostomy will before long receive a wider recognition.

Here I ought to touch on the delicate question of appendicitis. I hope it is not too audacious to say that a number of appendices removed *à froid* are not removed on account of appendicitis. The late Diakonoff demonstrated that morbid symptoms, in the region of the cæcum, sometimes remain after a radical operation for appendicitis. Rozanoff,

FIG. 21.



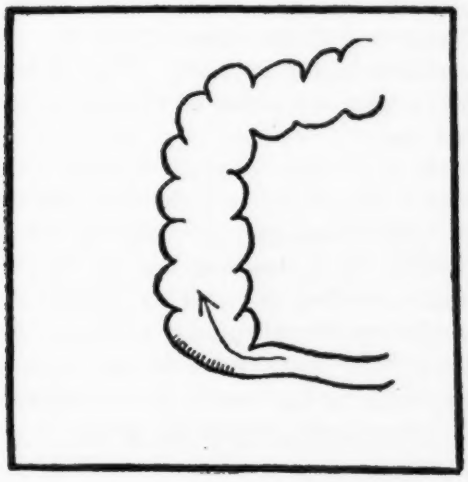
Wilms and Stierlin have quite recently attempted to solve this problem by assuming the existence of a *cæcum mobile.* I do not wish to argue that such a trouble exists, and that in cases with a marked mobility of the cæcum it is necessary to adopt cæcopexy, following the method described by Stierlin or Klose. There is, however, no doubt that in the definition of the disorder we have, above all, to consider the condition of typhlectasis. In my opinion, Rozanoff quite correctly endeavors to combat such dilatation of the cæcum by stitching it over.

During the last three years, whenever I could, I systematically combined the resection of the appendix with an obliteration of the cæcum, by invaginating the latter so far, until its lower border became level with the lower border of the entering ileum (Fig. 22). The problem, nevertheless, remains unsolved, because in the syndrom of symptoms

described by Rozanoff and Wilms, it is the typhlitis that still plays the first rôle. Through fixation or through obliteration of the cæcum we are able to influence the solution of typhlitis in a series of cases, but not always.

Thus, a new problem arises: Would it not be better instead of removing the appendix to make use of it, by performing appendicostomy in those cases, where typhlitis is well marked and defying medicinal treatment, and in those cases, where the appendix is found to be normal, as well as in those cases, where typhlitis is not favored by any bends of the large intestine? I can foresee combinations which would render the application of appendicostomy difficult, for example, typhlectasy,

FIG. 22.



but, on the other hand, there still remains a series of cases where appendicostomy is more suitable than appendicectomy.

Both operations preventing the danger of a subsequent acute appendicitis will differ in that after appendicostomy the whole of the large intestine is accessible to treatment. Since I am absolutely convinced that catarrhal appendicitis and typhilitis, in a great number of cases, are only part of the symptoms of colitis, therefore we may expect a great deal of good from appendicostomies.

The observations of Fedorovitch and others show that appendicostomy applied in such troubles as dysentery, for example, does not always result in a cure, relapses sometimes making their appearance. Theoretically this may be explained by the fact that an intestinal fistula

does not put the large intestine into a condition of inactivity. And should such a condition be necessary, then appendicostomy does not appear to be sufficiently energetic a measure. Now, is such a condition of rest really necessary?

As I have said before, the complete unilateral exclusion does not immobilize the large intestine. But even if it did, I should not recommend it, as a rule, in cases of ulcerative colitis. The only patient I have lost through peritonitis following the exclusion of the large intestine, which was performed for a non-malignant trouble, was just the patient with ulcerative colitis. In mucomembranous colitis, according to my observations, ileosigmoidostomy, even when combined with a fistula of the cæcum, does not achieve its aim, since passing in the opposite direction the fæces must necessarily irritate the bowel.

Thus, when the diseased gut is considered useless and even harmful to the patient, then there remain only the complete bilateral exclusion and resection of the intestine. When it is desirable to preserve the gut, and to give it a period of rest, we have at our command only the artificial anus.

It is impossible to disagree with Lindenberg, who maintains that from a theoretical point of view a right-sided anus, that is, an anus of the cæcum, is more advantageous, because it immobilizes the *whole* of the large intestine. It is, however, less convenient to the patients. Roth and Nehrkorn, finding the chief pathological changes in the sigmoid in cases of ulcerative colitis, have preferred the left-sided anus, as being somewhat more comfortable for the patients. In order to decide this matter recourse has been had to statistics. Having added the figures of Nehrkorn and Lindenberg we get:

From 20 left-sided ani ..... 15 recoveries.
From 28 right-sided ani ..... 14 recoveries.

We can hardly use such statistics as a guide in the choice of this or another mode of treatment. The individual investigation of cases has proved that sometimes not only the left-sided, but also the right-sided anus were of not much use.

Poucel, being unsuccessful in performing the right-sided anus, suggested an anus of the ileum. I have mentioned already a female patient, in whom after a series of operations the cæcum and the colon, which were subjected to a double exclusion and a fistula, became quite painless. Similar to this, the large intestine sometimes does not bear well the presence of fecal matter, and does not tolerate syringing, responding with painful contractions to the slightest irritation. All

our operative plans become frustrated through such complications, and, of course, eventually there remains only one issue, that is an anus of the ileum.

I hope that the problem of the right-sided and the left-sided ani will be cleared up in the course of time with the aid of a more exact diagnosis. For several reasons there are in the large intestines two most vulnerable places: the cæcum and the sigmoid. Most of the pathological processes have here their origin; carcinoma, tubercle, actinomyces and colitis prove this beyond dispute. So that if ulcerative colitis affects the cæcum, then it is useless to establish the anus on the left side; and *vice versa,* in disorders of the sigmoid it is apparently more to the purpose to perform the anus on the descending colon.

Having once touched on the question of the operative treatment of colitis, we are justified to raise the following question: Is the operative treatment of colitis altogether feasible? The solution of this problem is not, strictly speaking, within the scope of my present task; however, in order to avoid any misunderstanding, I shall briefly go into this matter. In my opinion a large number of cases of colitis ought to come under the care of physicians. Though certain types of colitis, for example, the mucomembranous, are only with difficulty amenable to treatment, and though the latter may last a considerable period, there is no reason whatever to hurry with operative steps. Only then when medical treatment being powerless and the condition of the patient becomes worse, operative measures are strictly indicated. I should even go a little further: in such cases one ought not to protract the treatment too long, since a colitis, which in the beginning might easily be cured by a comparatively simple intervention, may in the later stages resist even more radical measures. The more so, as my personal observation has taught me, that frequently it is the anatomical position of the large intestine that through its abnormalities accounts for the incurability of the trouble, especially if the latter is of the local type. I believe more and more that an anatomically abnormal position of the large intestine predisposes to the origin, and supports the existence of all kinds of colitis.

Thus, our intention to immobilize the large intestine gives the first indication to the establishment of the artificial anus; and we desire to immobilize the whole of it in cases where the trouble is more widespread, partial immobilization being desirable if the trouble is more localized. To this is closely related the indication for the performance of an artificial anus, as a preliminary act before resecting or amputating

the rectum, for instance. The two just mentioned types of ani belong to the group of the temporary ones.

A third indication is given when an overfilled bowel has to be emptied, that means when the symptoms of obstruction, especially of a malignant character, begin to appear. The experience of German surgeons, who were very enthusiastic about Mikulicz's "two step" resection of the large intestine, and who intended to resect the new growth and to establish artificial anus at the same time, emphatically speaks in favor of the fact that in cases of obstruction caused by malignant disease one ought to make an artificial anus, only an anus, and no more. Every surgeon can confirm the above statements from his own experience. Even here, though the operative steps taken are rather insignificant, mortality appears to be great. This becomes quite intelligible in view of the fact, that almost all these patients are in a moribund condition when operated upon. Let us look at the results of artificial ani in cases of malignant obstruction:

Author	Number of cases	Number of deaths	Mortality
			Per cent.
Schmidt	12	4	
Petermann	30	14	46
Paul	24	9	
Angschutz	37	19	35
Total	103	46	44

Also in this case, that is to say, when an artificial anus is made in order to relieve the obstruction, the anus may be either temporary, and the large intestine may subsequently be resected, or permanent, thus representing the ultimate surgical step of a palliative nature.

In discussing the operative treatment of the diseases of the large intestine I have frequently dwelt on temporary measures. I have thus discussed the temporary unilateral exclusion with formation of a fistula, the temporary complete exclusion, and the temporary artificial anus. The majority of these temporary measures are directed toward enabling us to perform resections of the large intestine with less risk for the patients, since it is just the resection which is really the radical measure. And then when there is no hope to cure the complaint without a resection, the latter, when practicable, gives the best results. Therefore the application of resection appears to be a very wide one, beginning with congenital malformations, such as the case of Prof. Trinkler, and such conditions which have a congenital predisposition,

for example, the *megacolon congenitum,* including benign and malignant new growths as well as inflammatory tumors of the bowels, the resection is applied also in cases of volvulus, and finally even directed against all varieties of colitis. Processes which necessitate the adoption of resections differ with regard to their extent, so that they even may spread over the whole of the intestine. The resection of certain portions of the large intestine, such as, for example, the transverse colon, brings with it a functional disturbance in the greater part of the large intestine. We have therefore first of all to consider the limits of the resection which are permissible.

Experimental pathology teaches us that in dogs we may remove the whole of their large intestine. The investigations of Lane inform us that also in men the whole of the large intestine may be resected without any danger. Hence it follows that the greater part of the large intestine can be removed without any harm to the patient, but often with great benefit. Two of my female patients are practically deprived of the function of the large intestine. It is clear that there remains very little of this function after a resection of the sigmoid, of the colon descendens, almost the whole of the transverse colon, with a fistula of the ascending colon; or after a resection of the transverse colon, as well as after a bilateral exclusion of the ascending colon and cæcum, with a fistula of the sigmoid. In spite of all that, however, I must confess that the absence of the large intestine does not in the least affect the patients. On the contrary, both of them feel much better without it than with it.

We take it for granted that it is still premature to decide categorically one way or the other the question of the significance of the resection of the large intestine. Nevertheless, the facts which we have at our disposal permit us to say that such extensive resections, as one-half to two-thirds of the colon, do not exercise any deteriorating influence on the health of the patient at all. This, however, is of great significance; since in performing a resection, on the one hand, care has to be exercised in order to prevent the formation of cul-de-sacs and portions of the gut closed at both ends, and on the other hand, it is often convenient to remove an extra piece of the bowel when it is either distended or packed with fæces, simply in order to diminish the risk of the operation.

Thus, for example, it is helpful in cases of tuberculous or malignant stricture of the hepatic flexure to remove the distended ascending colon and the cæcum in order to avoid infection. In this

respect I fully share the views expressed by Haberer. Moreover, physiology gives us the right to take such measures.

No doubt, the patients tolerate resections according to the character of the trouble. Simple inflammatory swellings of the large intestine as well as tuberculous ones may be removed without any particular danger. On the other hand, great resistance towards our measures is exhibited by patients suffering from malignant disease.

It is sufficient to glance at the figures I quoted to see that out of 10 resections undertaken on account of the so-called non-malignant troubles, I lost only one. Out of 6 resections of cancer, three ended fatally.

Such position of affairs made Mikulicz inclined to suggest his "two step" resection of the cancerous colon. I am not going to enter deeper into the discussion which arose in connection with the "one," as well as the "two step" operation. It seems to me to be quite sufficient to mention that having added all the figures, Finkelstein found that the "one step" operation shows 29 per cent. mortality, whereas the other shows 16 per cent. Herefrom we have to draw the conclusion that for malignant cases, where the patients are greatly exhausted and where the tumor has attained a considerable size, we must give preference to the "two step" resection.

It has to be taken for granted, that every one of those troubles which are amenable to such treatment is capable of exhausting the patient to a high degree, thus lowering his vitality. It appears to me therefore that, although on principle preference is given to the "one stage" operation, as this does not leave any fistula behind, the "two stage" operation has to be applied in particularly feeble patients requiring very extensive resections. In short, the "two stage" operation always remains in reserve for such cases in which it is more advantageous to refrain from the "one stage" resection.

Besides the methods already described there exists, of course, the "many stage" resection. I do not object to it in the least; on the contrary, I am ready to support it, as I have myself suggested a "three stage" resection. However, to describe this in detail would entail a very minute discussion of the technic, which I should like to avoid as much as possible.

In conclusion, nevertheless, I ought to mention one or two points about the technic, since the latter throws some light on the results of my operations, of which I have quoted the figures above. Without criticising the methods of either Rostovtzeff or Moskowicz, I must add that so far I have not adopted them. I have always been making

use of the lateral anastomosis, when uniting the ends of the colon. In dividing the gut, I always first separate a portion of it from the mesocolon, and then I carry out two circular incisions as far as the muscular coat. Just outside these incisions and on either side of them, a purse-string suture is applied; a ligature is put around each of the incisions, and the gut is divided between them. After that the end of the intestine, swabbed with pure carbolic, is immediately pushed into the gut, and the purse-string suture tightened up. On top of that one or two layers of seroserous sutures are placed. It appears (and it is really so) that in the most extensive and most difficult resections, the instruments required are of the simplest possible kind. No special enterotribes, no particular types of clamps, besides those of Doyen, which are also only used in order to clamp the lumen of the gut to be divided, and no buttons whatever are necessary.

It is obvious that my results are far from being perfect, and the mortality of cancer cases is particularly high. I might be contented with the results achieved by the resections and anastomoses, which were carried out for other troubles. Anyhow, I do not expect any improvement of the situation through the use of more complicated instruments, especially in cases of malignant disease. I believe, however, that the results will become better, when the operative measures will be undertaken a little earlier than is the case now; that is, before the stage of cachexia has been reached. The operations will be thus rendered easier technically, they will be better borne by the patients, and will therefore yield better results.

PRIMARY SARCOMA OF THE LOWER END OF THE FEMUR INVOLVING THE SYNOVIAL MEMBRANE

WITH A CRITICAL REVIEW OF THE LITERATURE OF SYNOVIAL SARCOMA
REPOBT OF ONE CASE WITH COMPLETE PATHOLOGICAL AND RADIOGRAPHIC EXAMINATION

By S. Fosdick Jones, M.D.
of Denver, Colorado
and
Ross C. Whitman, M.D.
of Denver, Colorado

In considering the subject of primary sarcoma involving the knee-joint, it is a well-known fact among surgeons and pathologists that these sarcomatous growths of the lower end of the femur simulate tuberculous disease of the joint, and the differential diagnosis between tuberculosis and sarcoma of the knee-joint frequently presents difficult problems.

Primary synovial sarcoma of the knee-joint is of such great rarity, as can well be judged by the meagre literature * upon this subject, that the writers wish to record their case and to review the literature of similar cases which have previously been reported. They consider that their case presents several very unusual phases of this interesting subject and, therefore, will report at some length, not only the clinical, but also the complete pathological and radiographic findings.

The case which the writers are reporting was kindly referred to one of us (Dr. Jones) by Dr. Charles A. Powers of Denver.

History.—A young girl of seventeen years presented herself for examination on October 30, 1913. She was one of four children and was born and had always resided in Colorado. She had lived a healthy out-of-door life and with the exception of the diseases of childhood, namely, pertussis, diphtheria and measles, her previous history as a young child was negative.

When twelve years of age she was subject to severe attacks of muscular rheumatism, but there had never been any accompanying joint manifestations.

Family History.—The father is an active, healthy man and the mother is living and is in excellent health. There is no history of malignancy, tuberculosis or syphilis.

Menstrual History.—For the past four months, the menses had been very irregular. The flow at first was very scanty and later ceased en-

* We are indebted to Dr. C. D. Spivak, of Denver, and to Dr. F. Robbins, of New York, for their aid in reviewing the literature.

tirely. When first seen by the writer she had not menstruated for two months. The existing amenorrhœa was considered due to her present illness. On pelvic examination the uterus was small and underdeveloped and was in extreme retroversion.†

Present History.—About the first of September, 1913, two months before seeking surgical advice, she noticed a slight swelling over the inner condyle of the right femur. The pain which accompanied this swelling was intermittent in character, and was never severe.

The motion at the knee-joint was at first not restricted; the skin was not reddened and there were no abrasions. At this time her general health was excellent and she was able to attend school.

In the early part of October, owing to the swelling and a beginning slight stiffness in the right knee, she consulted a masseur, who advised massage, electric light baths, and hydrotherapy, but at the end of a week there was no improvement and this treatment was discontinued.

On examination, the patient presented a moderately swollen right knee, not symmetrical, the swelling being more marked over the inner condyle of the femur, and extending upward, three inches above the patella.

She walks with a right limp, holding the knee in slight flexion.

The leg can be extended on the thigh to an angle of 170 degrees, the flexion deformity being 10 degrees.

Motion, both active and passive, is not painful. There is no local heat and no redness of the skin. On deep pressure over the inner condyle, pain is experienced. The patella is freely movable and is not enlarged, and there is no joint crepitation. There is a distinct patella "click" and there is fluid in the joint and in the synovial pouch under the quadriceps extensor tendon of the thigh. Muscular spasm is present but is not marked. There is slight atrophy of the calf muscles, but none of the thigh. There is no displacement of the internal semilunar cartilage of the knee.

The ankle- and hip-joints are normal. The inguinal and popliteal lymphatic glands are not enlarged.

Measurements.—The right knee: Above the patella is 13¼ inches; over the patella is 13½ inches; below the patella is 11¾ inches.

The left knee: Above the patella is 13 inches; over the patella is 12½ inches; below the patella is 11½ inches.

The circumference of the right calf measured four inches below the patella is 11¾ inches.

The circumference of the left calf measured four inches below the patella is 12 inches.

The circumference of the right and left thighs measures 14¼ inches.

The length of the tibiæ of the right and left legs measures the same.

The temperature is 98.4° and the pulse is 70.

The hæmoglobin is 80 per cent. and the red blood cell count is 4,260,000.

The heart and lungs are normal.

The radiographic examination made by Dr. S. B. Childs, at the time of the writer's first examination, showed no bony involvement of either

† Gynæcological examination made by Dr. C. B. Ingraham.

articular surfaces of the tibia or femur or of the femoral shaft. In the skiagram showing the lateral view (Fig. 1) there is an increased shadow in the synovial cavity, more marked above the patella. There is no roughening or thickening of the periosteum, and no areas of rarefaction.

The anteroposterior view (Fig. 2) shows no bony pathological lesion.

The diagnosis was made of probable synovial tuberculosis and the patient admitted to the hospital for treatment.

Absolute rest in bed was insisted upon and the affected limb was placed upon a double inclined plane with lateral immobilizing splints and twelve pounds traction applied to overcome the flexion deformity. For two weeks decided improvement was noticed and no pain was experienced. During the patient's third week in the hospital, the swelling increased, particularly in the synovial pouch under the quadriceps of the thigh. The pain both on active and passive motion became very severe, more marked at night. The flexion deformity had been overcome entirely and extension was complete. The temperature was irregular, showing an evening rise of 100° to 101°, and the pulse, although of good quality, was increased from 80 to 100.

There was no crepitation on motion of the joint and the inguinal glands were not enlarged.

The presence of severe pain in the knee, even with the joint immobilized, the rise of temperature, the rapid distention of the joint with fluid, and the increase in the circumference of the knee, and the loss of appetite, aroused the suspicion of the writer that the case was probably one of malignancy and not of tuberculosis. A tentative diagnosis was made of sarcoma of the knee-joint.

The leucocyte count at this time was 15,200.

Aspiration of the joint was performed on November 26, 1913, twenty-one days from the time that treatment was first instituted. Two and one-half ounces of bloody fluid were obtained, free from pus and having no odor.

This fluid was then injected by Dr. Whitman into the peritoneal cavity and liver of a guinea pig and also microscopical smears were made of the aspirated fluid. No pus cells or bacteria were found in these smears. After an interval of seventeen days the guinea pig was killed and sections were made of the liver and spleen. The microscopical examination showed these organs to be normal and no evidence of tuberculosis was present.

Awaiting the pathological report, a more complete immobilizing splint was applied. The pain in the knee greatly increased, the temperature was higher, the pulse was increased in rapidity from 80 to 110 but was of good quality.

The leucocyte count was 16,000. The urine was normal.

On December 13, a consultation was held with Dr. C. A. Powers, and it was decided that an exploratory incision into the joint be made.

On December 15, under ether anæsthesia, free lateral incisions were made on either side of the patella and the joint carefully explored. Upon

FIG. 1.—Skiagram showing the lateral view of the right knee. There is an increased shadow in the synovial cavity, more marked above the patella. The articular surfaces of the tibia and femur are normal in appearance and no bony change is noted in the femoral or tibial shaft.

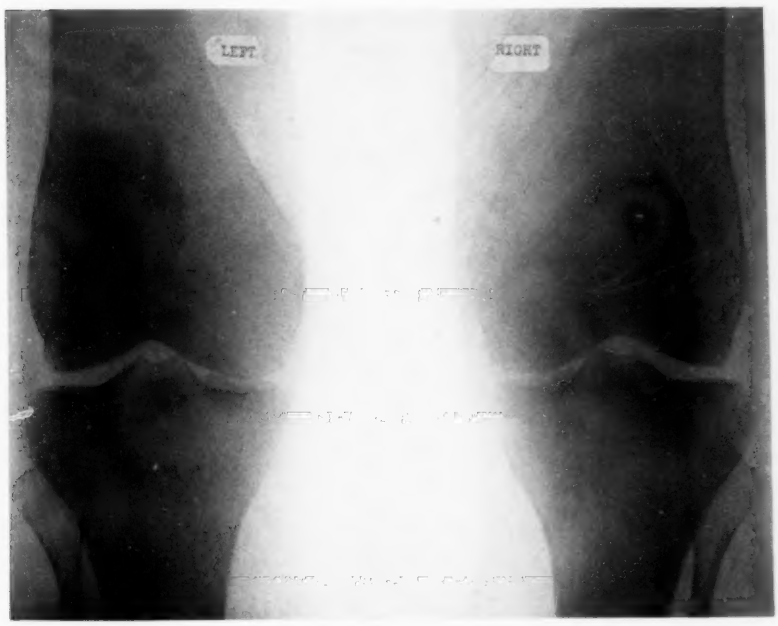


FIG. 2.—The anteroposterior view of both the right and left knees. No bony change is seen in either the articular surfaces or in the shafts of the femur and tibia. There is no roughening or thickening of the periosteum.

FIG. 3.—Skiagram taken of the amputated femur. The shadow of the femoral shaft is of uniform density, except at the inner condyle, where portions were removed for histologic examination. A marked involvement of the synovial cavity with a sarcomatous tumor is clearly demonstrated. The upper arrow points to the tumor involving the synovia, and the lower arrow to the sarcomatous involvement of the internal femoral condyle.

FIG. 4.—Photograph of the longitudinal section of the femur. The dark area at the lower end of the bone shows the region involved in the sarcomatous growth. The synovia covered by tumor tissue is seen at the right. Near the hand at the bottom of the photograph, the involved inner surface of the synovial sheath can be distinctly seen.

FIG. 5.—Photomicrograph of the tumor tissue from the bone marrow. Zeiss. apo. obj. 16 mm. comp. oc. No. 4. Van Geisen stain.

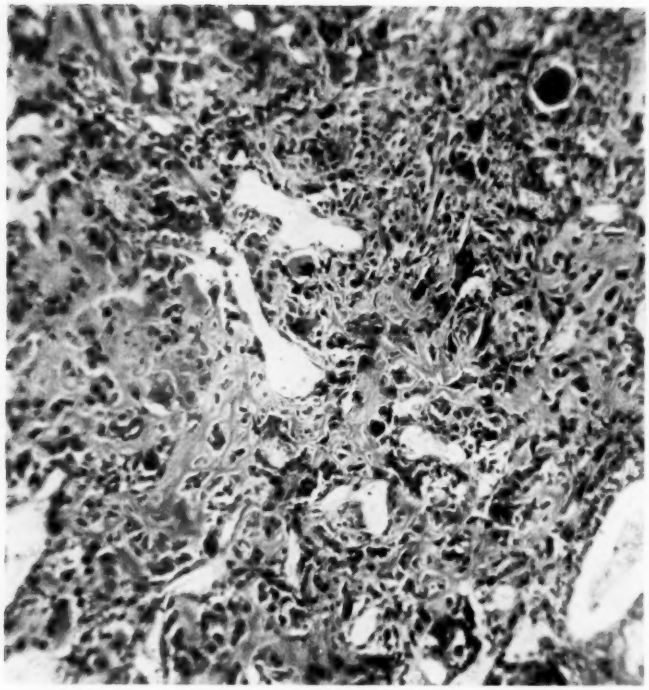


FIG. 6.—Photomicrograph of the sarcomatous tumor involving the synovia. The lower blood-vessel in the centre shows a definite endothelial wall. In the tissue between the blood-vessels are two tumor giant-cells; one is mitosis. Other similar cells are found in the field. Below and toward the left, the stroma is hyaline and blue staining (osteoid).

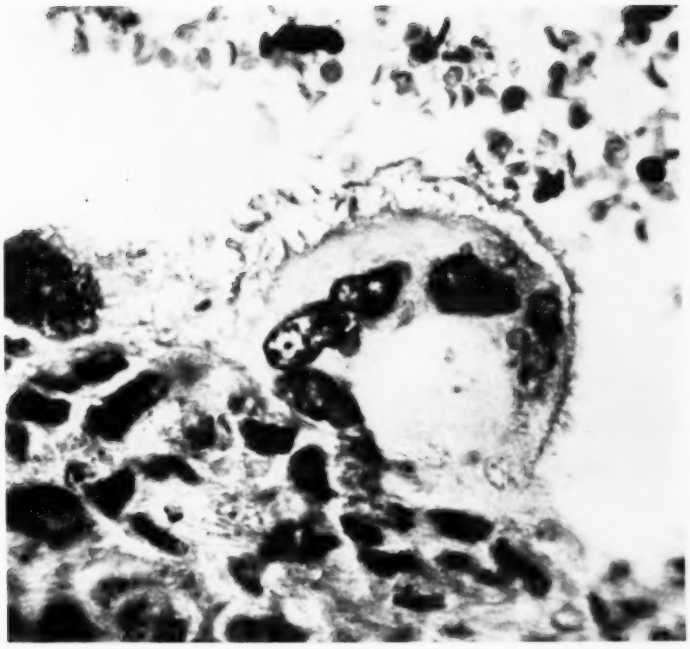


FIG. 7.—Photomicrograph of an endothelial or foreign body giant-cell, lying in the lumen of a vessel and attached to its wall. Zeiss. apo. obj. 2 mm. oil, comp. oc. No. 4. Eosin and methylene blue staining.

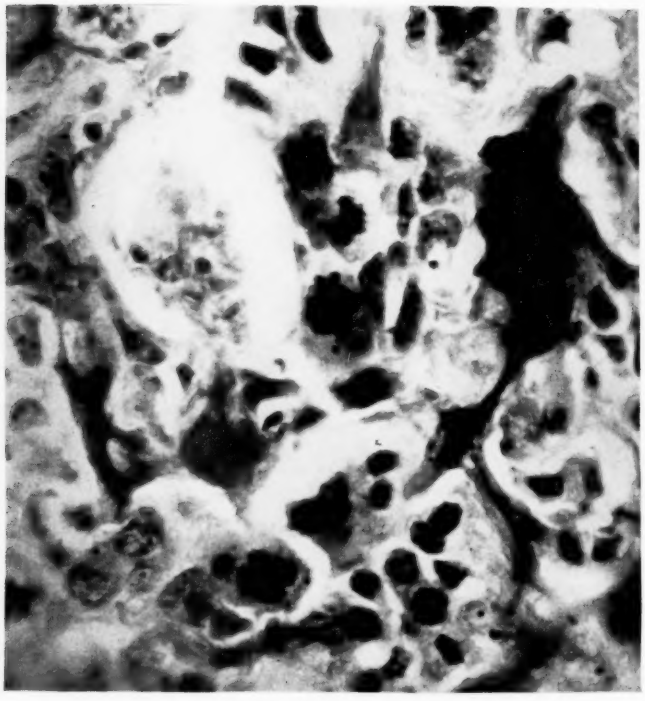


FIG. 8.—Photomicrograph showing three mitotic figures in the field. Near the upper right-hand corner is a very large mononuclear tumor cell, with basophilic protoplasm and numerous protoplasmic processes. Zeiss. apo. obj. 2 mm. oil, comp. oc. No. 4. Eosin and methylene blue staining.

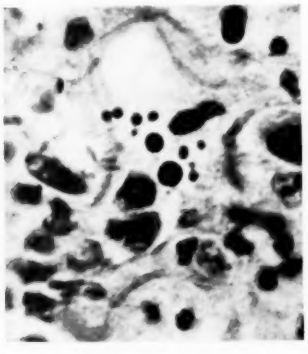


FIG. 9.—Photomicrograph of a group of yeast cell-like bodies of degenerative origin.

incising the capsule and synovial cul-de-sac under the quadriceps, the joint and synovial cavity were found to be filled with a reddish-brown, friable substance, but no pus was present. Apparently the patella and articular surfaces of the joint were normal, but the space immediately above the inner condyle and in the intercondyloid notch were eroded.

A frozen microscopical section was made at the time of the operation by the pathologist (Dr. Whitman), and showed this friable material to be sarcoma.

Owing to the patient's poor condition at the time of operation, it was thought wise to postpone amputation of the thigh for 48 hours. The wound was therefore packed with gauze, sterile dressings, and a posterior splint applied.

On December 17, Dr. Charles A. Powers performed a high thigh amputation; a small drainage tube was inserted and the wound closed with silkworm-gut sutures. The inguinal glands were removed for pathological examination and were found to be normal.

The patient's condition following the operation was very satisfactory and her convalescence was uninterrupted. During her remaining stay in the hospital she gained several pounds in weight, the temperature was normal, the pulse of good quality. The number of red blood-cells had increased to 5,120,000, and the hæmoglobin to 85 per cent.

She was allowed to return to her home on January 24, 1914, being able to walk about on crutches.‡

Complete Pathological Report. Gross Appearance.—The tumor is a soft friable mass of a bright red color, 0.5 to 2 cm. thick, spreading over the outer surface of the synovial sheath, chiefly on the outer and on the posterior aspect. It also covers the front of the joint in the region of the knee. The inner aspect is involved only slightly and in the immediate neighborhood of the joint.

The inner surface of the sheath is smooth, gray, and shining. There are no adhesions of the sheath to the bone.

The bone itself is apparently involved only at the lower end of the femur. Here the bone is eroded in front and behind, between the condyles and extending upward and outward to form an irregular wedge-shaped opening, leaving a cavity filled with soft, pasty, dark reddish-brown tissue. The periosteum is intact to within 3 to 4 mm. of the edge of this cavity.

The tumor tissue removed from the marrow, fixed in 10 per cent. formalin, decalcified, refixed, embedded in celloidin and stained with hæmatoxylin and eosin, Van Gieson, and Kresylecht violet, presents, in addition to extensive coagulation necrosis and hemorrhage, the following features: Solid cell cords of varying width infiltrate the marrow, branching freely and fusing at points of contact to form anastomoses. Each cord of cells consists of an outer rim of small slightly spindle-shaped cells so arranged as to simulate closely the normal arrangement of osteoblasts. The cells are quite uniform in size, with round or very slightly oval vesicular nuclei, and a somewhat scanty eosin staining granular proto-

‡ Since reporting this case the patient died, in April, 1914, of metastasis involving both lungs.

plasm. There are no giant mitoses or Langhan's giant-cells. Toward the deeper region of each cord the cells are more and more separated by intercellular substance. which forms a loose open meshwork in the vacuoles of which the cells lie, one in each opening. Here and there the meshwork becomes denser, lying in irregular branching collections of hyalin material. This material stains red with Van Gieson or hæmatoxylin and eosin staining, but takes the basic stain in sections stained with eosin and methylene blue. The resemblance to normal osteoid tissues is so close as to be startling.

Tumor tissue from the synovia presents a very different picture. This was fixed in Zenker solution, embedded in paraffin and stained with eosin methylene blue, aniline blue fuchsin, and phosphotungstic acid hæmatoxylin. There is fairly abundant stroma of collagen, in which the cells lie singly and in small groups. The shape and size of the tumor cell vary greatly, some being small and spindle-shaped, others very large, 40 microns or more in diameter, with large, irregularly shaped, bladder-like nuclei. The protoplasm is relatively abundant in all cells, granular eosinophilic, but often containing minute basophilic granules which may be very irregularly distributed, giving the cell a curiously striped or blotchy appearance. Many of the larger cells contain 2 to 4 or more irregular or oval nuclei. Mitotic figures are abundant, often four or five being found in a single high-power field, very many of them atypical. All these degenerative changes may be taken as indicating a relatively rapid growth and high malignancy as compared with the tumor in the bone marrow. Hertzler[17] (*Treatise on Tumors*, p. 109) mentions that metastases of endosteal tumors are frequently more malignant than the parent tumor. In sections stained with phosphotungstic acid hæmatoxylin, fairly abundant delicate wavy fibrils can be made out, lying partly within the cell protoplasm, partly outside. These are obviously imperfectly formed fibroglioma fibrils.

In a few areas small masses of tumor cells become hyaline, presenting the picture of a very imperfect formation of osteoid tissue. This is practically the only feature suggesting a common origin for the tumor in both sites.

Blood-vessels, or blood sinuses rather, are abundant, large, tortuous, and freely anastomosing. In many, a definite endothelium has either in whole or in part undergone irritative hyperplasia, becoming higher, plumper, and often desquamating into the lumen. Not a few vessels contain giant-cells of the Langhan type, attached to the vessel wall, and more or less surrounded by desquamated plump endothelial cells. It is not always possible to distinguish with certainty between such endothelial cells and the neighboring tumor cells. Nevertheless, there are no whorls or other evidence of neoplastic proliferation of the endothelium.

One of us (Whitman, *Journal Medical Research*, vol. xxiv, p. 465. 1914) [18] has recently discussed the intravascular formation of giant-cells in tumors and in various other lesions, emphasizing the fact that the cells are not tumor cells, but endothelial in origin, and bear, to quote

Ribbert, the same relation to the tumor cells that is borne by similar cells found in granulation tissue, etc., to the latter processes. In this case we have a tumor containing two types of giant-cells, one type being a true tumor cell, and important as indicating rapid and incomplete division of the cells, hence high malignancy. The tumor is a true giant-cell sarcoma. There are also present giant-cells not originating from tumor cells, but which are purely extrinsic, and which have no more voice in deciding the fundamental character of the neoplasm than the presence or absence of pus cells or of necrosis would have. It is greatly to be regretted that the clinician cannot more quickly and generally abandon a nomenclature based upon what is widely recognized among pathologists as a total misconception of the relation of the latter cells to these tumors. Mallory has recently emphasized the same important facts.

One other point deserves emphasis. In the paper above referred to, the wide divergence of opinion expressed concerning the malignancy of bone marrow myeloma was discussed and explained as due, in part, to the fact that some of these tumors are unquestionably of endothelial origin. Here we find a quite different explanation. Every one knows that many "giant-cell sarcomata" of the bone marrow are benign. Here we deal with one that is clearly highly malignant. Leaving quite open the question whether there is a corresponding difference in the point of origin (marrow cells in the one case, endosteum in the other, for example), one may state with all possible emphasis, and quite dogmatically, that a diagnosis of "myeloma" or "giant-cell sarcoma" does not in the least clear the air. Benignancy or malignancy must be decided for each case independently, and the diagnosis reached on grounds entirely separate from the presence or absence of endothelial giant-cells. The fact that the problems raised by border-line cases are often peculiarly difficult to settle only makes the careful study of all cases the more pressing a duty.

In view of the manifest non-involvement of the periosteum (save as a purely secondary matter) and of the osteoid character of the growth, we may conclude that the tumor is an osteoid sarcoma, endosteal in origin, of relatively slow growth within the bone, with early metastasis to the synovia, here manifesting so marked an increase in malignancy as to very closely simulate primary sarcoma of the latter tissue. For emphasis it may be repeated that some "giant-cell sarcomata" are benign and some are malignant, and that the giant-cell is of no weight in deciding this question.

The findings in this case must be regarded as impugning the authenticity of every recorded case of primary sarcoma of the synovia, in which there is no definite statement, not merely that the bone and marrow were normal, but as to how they were shown to be normal. Radiographic evidence alone regarding the bone marrow cannot be taken as conclusive.

The cuts with their accompanying legends will perhaps make clearer the chief points discussed in the text.

The case which has formed the theme of this report is of such unusual interest that it may be wise, in concluding, to emphasize the more salient features.

First, the fact that it is, so far as the writers are able to learn, the youngest case reported in the literature of a primary synovial sarcoma of the knee-joint.

Second, the great similarity of these cases between tuberculosis of the knee-joint, particularly of the synovial type, and synovial sarcoma. Coley [19] in his lucid and interesting article in the ANNALS OF SURGERY for 1907 says, "It may be quite impossible to make a diagnosis between these two conditions without the aid of a microscopical examination of a specimen removed."

The rapidly increasing amount of fluid in the knee-joint, the absence at first of pain and later the very severe pain coming on even after complete immobilization; the presence of an irregular temperature, with a marked evening rise, the increase in the pulse, and the character of the bloody or serosanguinous fluid obtained by aspiration; the absence of atrophy of the thigh and the slight atrophy of the calf muscles; the slight impairment of joint motion and the absence of crackling or crepitation on motion, are points to be deserving of special note.

Third, the radiographic findings which were negative at the time of the first examination, shown in both the anteroposterior and lateral views, forcibly emphasize the fact that, although every joint case should be carefully skiagraphed, it must be borne in mind, as pointed out by Coley, Stiles, Butlin and other observers that in these cases of sarcoma of the bones the X-ray frequently does not demonstrate pathological lesions present, and is very apt to be misleading. As in the writer's case, a negative skiagram should not be interpreted as positively excluding bone lesions.

Fourth, that careful pathological examinations should be made in every joint case before any radical surgical procedure be undertaken.

Review of the Literature.—A careful scrutiny of the literature finds that Simon,[1] in 1865, records the first case of primary synovial sarcoma of the knee-joint occurring in a man of forty-six years of age, who had complained of impairment of motion in the right knee for a period of six months. On the inner side of the knee was a mass 5 cm. in diameter and 1½ cm. in thickness. This tumor was removed, and upon microscopical examination was found to be highly vascular, covered with epithelium and presenting many spindle and large, round, irregular-shaped cells, with oval nuclei. Simon called this tumor a "hypertrophied sarcomatous synovial fringe."

Two cases are added to the literature by Weir,[2] of New York, in 1886. His first case occurred in a woman of twenty-four years who presented a pedunculated tumor of the right knee-joint. An incision was made two inches long, the tumor exposed, the pedicle ligated and the mass removed. Microscopical examination showed the growth to be a giant-cell sarcoma.

Weir's second case was observed in a man of thirty-nine years of age. The tumor of the knee-joint was pedunculated, of irregular shape, and yellowish-pink in color. Upon careful microscopic examination the mass was found to be composed of connective tissue, containing blood pigment and many round and spindle-cells and was classified as a fibrosarcoma.

In both of these cases, following the operation, the patients made good recovery, and the joint function was completely restored, and no recurrences were noted.

Annandale,[3] in speaking of the operative treatment of displaced semilunar cartilages of the knee, says that this condition sometimes simulates synovial growths of the knee-joint of sarcomatous origin. The author reports a case of myeloid sarcoma of the right knee occurring in a woman thirty-three years old. The tumor was movable and was situated in the region of the right semilunar cartilage and had been present for eighteen months. The mass was the size of a bean and was firmly adherent to the knee-joint capsule. The tumor was removed and eight years after operation there had been no evidence of recurrence or metastatic involvement.

Garré's[4] contribution upon this subject concerned a woman of thirty-four years, who complained of pain in the left knee for nine months previous to the time that she sought surgical aid. The knee was enormously distended and the joint capsule greatly thickened and the pouch under the quadriceps extensor muscle of the thigh was filled with a consistent tumor which extended into the knee-joint and filled the entire popliteal space. The diagnosis was made of tuberculosis of the knee, and an operation was advised. Upon opening the joint capsule it was found to be greatly roughened and thickened and greyish-yellow in color, resembling "brain cortex." Amputation of the leg was performed, but two weeks later a mass appeared in the left inguinal region, metastatic in origin, and death occurred at the end of the fourth week. The necropsy findings showed a general sarcomatous metastasis, a diffuse sarcomatous infiltration of the joint capsule and also an extension along the femoral diaphysis and penetrating into the external condyle, with sarcomatous invasion of the bone marrow. The microscopical appearance was of a round cell sarcoma. Garré regards his case as one of primary synovial sarcoma with secondary changes in the bone marrow, but Baumgarten, in discussing the

case, believes that the original sarcomatous focus was in the bone marrow and had later involved the synovia.

The writers have given a somewhat detailed report of Garré's case, as it very closely resembles the one which they are contributing.

In the *Lancet* for 1894 an interesting case was reported by Hardie and Salter.[5] Their patient was a man of twenty-five years who complained of pain in the knee for a period of five years. There was no history of injury to the joint. Three years following the first symptom of pain he noticed a small "lump" the size of a marble on the outer surface of the knee. At this time the patient met with an accident, falling upon the affected knee, which became swollen and very tender, requiring complete rest in bed and immobilization. He sought admission to the Manchester Infirmary and aspiration of the joint was performed. The fluid withdrawn consisted entirely of blood which had evidently been present in the joint for some time. An incision was then made on the inner side of the joint and a large cyst was opened containing blood and blood clot; this cyst was separated from the joint by a thin layer of fibrous tissue and the joint cavity was found to be filled with "granular, roe-like material," and the synovial membrane slightly thickened and reddened. Upon microscopical examination this "roe-like material" was found to be sarcomatous of the spindle-cell variety undergoing mucoid degeneration. The limb was then amputated and the patient's convalescence was uninterrupted. No metastatic growths were recorded.

Again, in 1898, Marsh[6] reported a case of primary synovial sarcoma before the Clinical Society of London. The patient was twenty-seven years of age, who had complained of pain and swelling over the inner condyle of the femur, for a period of fourteen months. The tentative diagnosis was made of tuberculous periostitis. At the time of operation, this swelling was found to be a new growth involving the synovial tissue. Curetting of the growth was performed and a microscopical examination made, showing the tumor to be of round-cell and mixed spindle-cell sarcoma. A short time after this operation there was a recurrence of the growth: first in the upper angle of the original scar, and later a mass was removed over the inner side of the knee-joint. Amputation was then performed. The great point of interest in Marsh's case is that the course of the disease extended over a period of nearly six years, showing that although the disease was one of fibrosarcoma of the synovia, it was a slow growing tumor.

Lockwood,[7] in 1902, adds one case to the literature, and Kruger[8] contributes one case in 1903, and in the same year Bornemann[9] reports one case occurring in a man of forty-five years.

Julliard-Descoendres,[10] in 1904, adds one case to the literature upon this subject. The patient was a woman of thirty-five years with an enormous cyst-like tumor of the knee-joint, which, when operated upon, was seen to have its origin in the synovial membrane. Microscopical examination showed the tumor to be a small round-cell sarcoma with the presence of giant-cells. Following the operation phlebitis occurred, resulting in death at the end of the fifth week. The necropsy showed no metastasis or local recurrence. v. Ruediger Rydygier, Jr.,[11] published, in 1906, in a Polish journal, another authentic case of primary synovial sarcoma occurring in a servant girl of twenty years of age. For two years previous to her consulting her physician, she complained of swelling of

the left knee and difficulty in walking. There was no history of injury and pain was not present. The knee was aspirated and 1100 grammes of bloody serum were withdrawn. A second aspiration was performed a week later and 600 grammes of the same character of fluid were obtained. The skiagram was normal. The knee was resected, and solid bony union obtained. There were no signs of recurrence one year after the surgical procedure. Microscopical examination identified the tumor as one of small round-cell sarcoma. Rydygier, in speaking of these cases of primary synovial sarcoma, emphasizes the fact that motion of the knee-joint is only slightly impaired, although the swelling of the joint may be very great. The aspirated fluid is always bloody or serosanguinous and does not contain pus, and the inguinal glands are not involved. Crepitation on motion of the joint is absent, and the periosteum is not as a rule affected.

Burckhardt,[12] in 1909, describes his case as one of "primary sarcoma of the knee-joint capsule," occurring in a man of forty-six years, who had met with an injury to his left knee two years previous. The knee was swollen, and on the outer side of the joint and below the patella was a soft mass the size of an apple. An operation which consisted in removing the tumor, the ligamentum patellæ and part of the patella, was performed, and the wound healed by primary union. The tumor, although in close relation to the synovia, had not involved that structure. Burckhardt states that tumors arising primarily from the synovial membrane do not exist and that in his case, which was microscopically shown to be fibrosarcoma, the synovial membrane was normal. This case, therefore, according to the writers, should not be classified under primary synovial sarcoma of the knee-joint.

Schon's[13] case, reported before the Danish Surgical Society in 1910, resembled in its early stages tuberculosis of the knee-joint. Following amputation of the thigh metastatic growths occurred in the pelvis. In the same year Lejars, Rubens and Duval[14] record the case of a youth of twenty-two years who presented, on examination, a greatly swollen knee, the swelling apparently being confined to the soft parts. The skiagram showed a normal bone appearance, both in the shaft and articular surfaces of the tibia and femur. At the time of the operation, the entire joint cavity was found to be filled by a compact grayish mass without softening or abscess formation. The articular ends of the tibia and femur were normal, but at the level of the external tuberosity of the tibia there was an area of diseased bone 3 to 4 cm. in diameter. This area was curetted and the synovia resected. Within one year recurrence took place and the thigh was amputated. The pathological examination showed the tumor to be sarcoma.

In St. Bartholomew's Hospital Reports for 1910 is a contribution by Andrews and Branson,[15] who exhibited a specimen of a left knee-joint, showing a sarcoma apparently originating in the synovial membrane. Microscopic examination showed the tumor to be a spindle-cell sarcoma. The case concerned a man of thirty-one years, who first began to complain of pain and locking of the left knee-joint when twenty-two years of age. The skiagram taken three months before the amputation of the thigh was negative. "A later skiagram showed the excavation of the patella." The most recent case found in the literature up to the present time was that reported by Blumenthal,[16] in 1912, occurring in a patient of twenty-nine years of age. A curetting of the synovial membrane

and removal of a portion of the internal lateral ligament was accomplished, but no more radical operation was performed. This patient made a satisfactory recovery with a good range of motion in the knee-joint. The microscopical examination was found to be sarcoma of the spindle-cell variety.

A very careful and thorough search of the literature therefore finds but seventeen authentic cases of primary synovial sarcoma, which, with the writers' reports, adds one more case to the bibliography.

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A TREATMENT FOR OLD CONTRACTED CICATRICES*

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There is scarcely any condition in surgery that so tests the patience, ingenuity and skill of the operator as the treatment of old cicatricial contractures. Especially is this true if the cicatrices are hard, dense and of long duration. It is not my object to review what has been done in the past in the field of plastic surgery, as the method of procedure in each case must be determined on the local findings. In one case the division of contracting bands may suffice, in another the sliding, twisting or transplantation of flaps, to take the place of the excised cicatrices may be required. In still other cases, especially of the extremities, the deformity may be so great as to require amputation.

Are bad cicatricial contractures following burns as frequent as they were a generation ago? Our present-day text-books on surgery would lead us to believe that they are not, as little attention is given to this very important subject. Possibly we have improved in the treatment of burns, certainly, antiseptic dressings and early skin grafting has reduced to a large degree the late bad effects.

It is often difficult and sometimes impossible in cases of cicatricial contractures to get healthy flaps, and if one be so fortunate as to succeed, the result is always in doubt, as the flap may slough on account of a deficient blood supply.

In old, dense cicatrices, the result of deep burns, plastic operations are not without risk, as important structures, such as nerves and blood-vessels may be caught in the scar tissue and their anatomical situation so disturbed as to render injury almost unavoidable.

The case I wish to present to-night was not treated by the usual method of plastic surgery. In this case a plastic operation has been done at the wrist and axilla with much improvement; at the elbow, where an old firm cicatricial contracture existed, a good result has been obtained. This result has been obtained, not by the usual method of dissecting out the cicatrices and the lateral approximation of healthy skin, nor by the sliding, twisting or transplantation of flaps, but by operative, medicinal and mechanical means.

*Read before the Philadelphia Academy of Surgery, March 2, 1914

E. F., aged seventeen years, white, was admitted to the Episcopal Hospital on May 16, 1913, with the following history:

At the age of 14 years he received a severe burn of the left side of the body, arm, forearm and hand. The patient was 18 months recovering from the burn. He was treated for ten and one-half months as an inmate in a local hospital in the town in which he lived, and for seven months after being discharged from the hospital, in their dispensary.

A physical examination of the patient on admission to the Episcopal Hospital showed the heart, lungs and other organs to be healthy. The left wrist was in extreme flexion, the joint ankylosed, and the overlying skin and cellular tissue consisted largely of scar tissue and contracting bands. The fingers could be freely moved. The thumb was partially ankylosed. The left elbow was markedly flexed and held by contracted bands of hard cicatrices. The left arm was held close to the chest wall by a large web of contracted scar tissue. The shoulder, chest and abdominal wall, and the latter anteriorly, showed contracted cicatricial tissue.

On June 12, 1913, a plastic operation was performed at the wrist, as his hand was so markedly flexed as to render it useless. At this operation an arthrectomy (first row of metacarpals removed) and a plastic operation were performed. The result was quite gratifying, as shown in Fig. 1. An arthroplasty on the wrist is the next operation we intend to perform. One month after the above operation the patient was discharged from the hospital in the condition as shown in Fig. 1.

On November 14, 1913, he was again admitted to the Episcopal Hospital, and on November 17, 1913, was operated upon and a plastic operation of the flap, sliding type, was performed on his axilla, the flap being gotten from the pectoral region. On his arm and forearm a different procedure was tried, many incisions were made along the contracting bands. These incisions extended into the healthy skin laterally and were of varying depth, some being quite superficial and others being deep enough to penetrate the cicatrices. After the wounds had ceased to ooze, fibrolysin, a compound of thiosinamine and sodium salicylate, was next rubbed thoroughly into each incision and also injected hypodermatically into the fibrous tissue. The wounds were covered with rubber tissue and a dry dressing applied. A straight splint, padded mould-shape to take up the concavity caused by the flexed elbow, was applied. The bandage holding the splint was firmly applied, so as to extend the forearm as much as possible.

For two days following the operation the patient complained

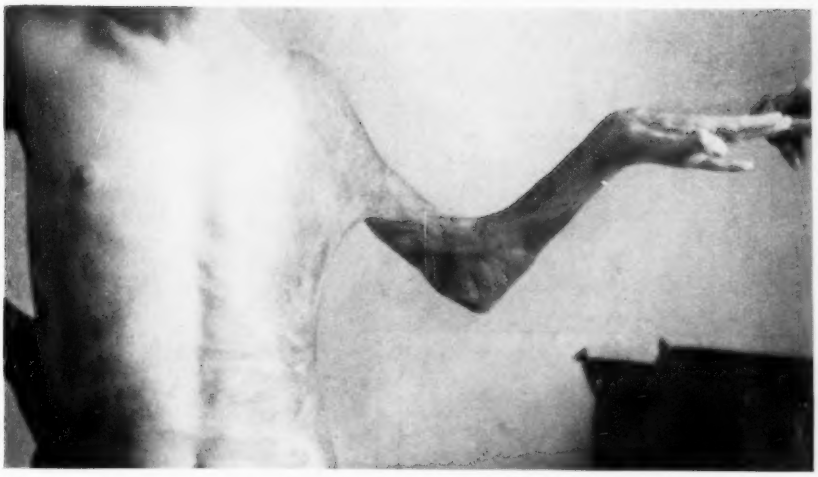

FIG. 1.—A plastic operation has been done at the wrist. Axilla and elbow show dense, contracted cicatrices.

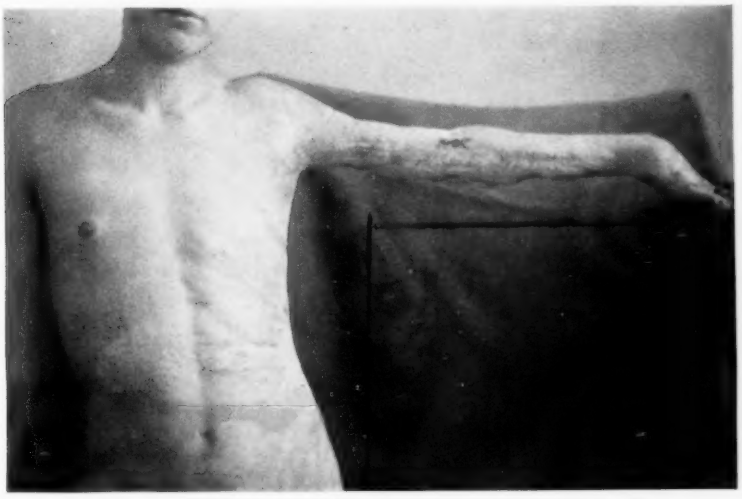

FIG. 2.—End result.

FIG. 3.—Back view.

of pain at the elbow. This was undoubtedly due to the extension made on the forearm.

In one week's time quite an improvement was noticed. The forearm could be extended fully fifty per cent. further than it could before the operation and the cicatrices were soft and pliable.

On December 4, 1913, the operation as described above for the administration of fibrolysin was repeated. After this operation the patient experienced nothing like the discomfort which followed the first. In ten days' time the arm was as straight as you see it now (Fig. 2). At each operation the contents of four ampoules of fibrolysin were rubbed into the incisions and injected into the cicatrices.

The after-treatment has consisted in the occasional injection hypodermatically of the fibrolysin into the site of the old cicatrices. Passive motion and massage have also been given. Three and one-half weeks following the second operation the splint was removed, but as the forearm showed a tendency toward flexion it was reapplied.

It is as yet too early to say what the ultimate outcome will be, as the tendency to contraction after the splint was removed has made me a little skeptical. No reactions were noted from the use of the drug.

Richardson, ANNALS OF SURGERY, December, 1911, in an article entitled " Studies on Peritoneal Adhesions," discusses the results obtained by specific drugs in the treatment of adhesions and cicatrices. He says, " Sidorenko has just reported the results of a clinical, experimental, and histological study of fibrolysin on cicatricial tissue. From a critical study of the results of other workers, and from his own results, he concludes that it does not exert any therapeutic effect upon cicatricial tissue."

A. H. Tubby, *British Medical Journal,* November 8, 1913, described a method of treatment of Dupuytren's contracture by flap dissection, excision of the affected fascia and the use of fibrolysin. While not following Mr. Tubby's technic, it was from his article that I got the idea of using fibrolysin in the way as described in this case.

Mr. Tubby, in speaking of his operative results in the treatment of Dupuytren's contracture, says, that in every case they were " infinitely superior " to those in which the thiosinamine (fibrolysin) was not used.

In the case just presented it is difficult to attribute the success to any one thing, as three distinct measures, operative, medicinal and mechanical were used. That the cicatrices were rendered soft and pliable lends weight to the drug.

LAMINECTOMY FOR SPINAL TUMOR *

A REPORT OF EXPERIENCES IN 37 CASES

By Charles A. Elsberg, M.D.
of New York City

(From the Surgical Department of the New York Neurological Institute and the Second Surgical Service (Dr. H. Lilienthal) of Mount Sinai Hospital)

In order to give a proper idea of the experiences of a single operator with the surgical treatment of tumors of the spinal cord and its membranes, it is necessary for him to report the cases in which tumors were found and removed, with the immediate and final results of the operative surgical interference, and to state in what proportion of the patients in whom the diagnosis of spinal tumor had been made, a tumor was found at operation. The purpose of my communication is to give a report of my experiences in this field, to tell of the errors we have made, of the lessons we have learned from our mistakes, and, finally, to describe certain technical procedures which I have found of value.

Among the last 100 spinal operations performed by me at the New York Neurological Institute, at Mount Sinai Hospital, and elsewhere, 58 patients were operated upon in whom the diagnosis of spinal tumor had been made, or in whom a growth could not with certainty be excluded. In a number of the cases, other lesions were considered more probable, but an exploratory laminectomy was performed in order to give the patient every possible chance. In 37 [1] of the 58 operations a spinal growth was found.

The tumor was extradural in 4 cases, intradural but extramedullary in 19 cases, intramedullary in 9 cases, and malignant disease of the bone was found in 5 cases.

Excluding the 5 patients in whom a malignant disease of the vertebræ was found, for which nothing could be done, there remain 32 cases of true spinal tumor, 9 intramedullary and 23 extramedullary.

Of the intramedullary tumors, 8 were in the cervical and 1 in the upper dorsal region; of the extramedullary tumors, 5 were cervical, 10 dorsal, 1 lumbar, 4 involved the roots of the cauda equina; in 2 patients there were multiple tumors in the dorsal and lumbosacral cord and around the roots of the cauda equina.

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* Read at the meeting of the New York Surgical Society, March 25, 1914.

[1] A histological study of the tumors will be published in the near future.

It may be of interest to first describe what was found in the 21 patients in whom the operation failed to reveal a tumor.

In 5 patients, nothing was found to explain the symptoms; one of these patients was entirely and permanently relieved of his symptoms (decompressive effect of the operation).

In 5 patients the operation showed that we had to deal with a central myelitis or softening of the cord. These patients were operated upon a number of years ago. The operations were purely exploratory in nature and the possibility or probability that we were dealing with a central myelitis was recognized before the interference.

In 4 patients a peculiar disease of the roots of the cauda equina was found. These patients presented the classical symptoms of tumor, but no tumor was found at the operation, the only lesion being a reddish-blue discoloration of the roots of the cauda equina. Several of the patients were much improved after the laminectomy and thorough washing out of the spinal canal. The cases have been described in detail in a paper by Dr. Kennedy and the writer (*Amer. Jour. Med. Sci.*, May, 1914), and we have called the disease "neuritis of the cauda equina." In several of our later cases we have recognized this disease and have been able to differentiate it from spinal cord tumor.

One patient, in whom multiple sclerosis was suspected, was enormously improved after the laminectomy. After having been bedridden for many months, he was able to be about and return to his work as an athletic instructor.

In 3 patients we were uncertain whether the disease was intramedullary or extramedullary. One of these proved to have an intramedullary cyst with diffuse syphilitic meningomyelitis; the second had a hydromyelia and was much improved by incision of the cord near the posterior median septum; the third suffered from syringomyelia and the incision of the cord was followed by marked improvement in the power of the upper extremities.

In 1 patient I found a localized serous meningitis; he was almost entirely relieved by the operation. In another, a peculiar abnormality of the posterior spinal vessels was found (see Fig. 1); in a third, a hopeless malignant disease of the sacroiliac joint was discovered. The patient recovered from the operation, but succumbed to her disease several months later.

It will be seen from this summary of the cases in which no spinal tumor was found, that in 7 patients (33 per cent.) complete relief or great improvement followed the exploratory operation. From these

cases, the conclusion is justified that even if a spinal tumor is not found at an operation, we may, nevertheless, discover a remediable condition or expect marked improvement in about one-third of the patients.

THE DIAGNOSIS OF SPINAL CORD TUMORS

Within the limits of this paper on the surgical aspects of tumors of the spinal cord and membranes, it would be impossible to enter upon a discussion of the symptoms and differential diagnosis of these affections. There are some special diagnostic features, however, which we have encountered and which merit a brief consideration.

I believe that a laminectomy is justifiable in many patients who have a progressive spinal disease with level symptoms, unless we are certain that there is a myelitis, a sclerosis, or a gliosis, and I have operated upon a number of patients in whom the history was totally unlike that of a spinal tumor, but in whom an easily removable growth was, nevertheless, found.

Thus, it is ordinarily stated that extramedullary spinal growths always begin with root pains, but I have three times removed tumors, pressing upon the cord, from patients who were very positive in stating that they had never had any pain during the entire course of their disease.

On the other hand, the generally accepted view that a painless beginning and the finding of dissociation of sensations, *i.e.*, loss or diminution of sensations of pain and of heat and cold, and preservation of sensation of touch, are characteristic of intramedullary disease will not hold for every case. I have operated upon two patients who gave a definite history of early and severe root pains, and in whom the physical examination failed to show dissociation of sensations, and who, notwithstanding, had intramedullary tumors of the spinal cord.

Therefore, the differential diagnosis between extramedullary and intramedullary tumor can not always be made with certainty, and the surgeon must be prepared for more than one surprise in this field of work.

The Brown-Sequard syndrome—most marked motor signs on one side of the body and most sensory disturbances on the other side—is often well marked in the early stages of tumors pressing upon the spinal cord, while in the latter stages, with complete paraplegia and complete loss of all sensations, very slight differences may indicate that signs of the Brown-Sequard character had previously existed. In the majority of instances the tumor lies upon the side which shows the

FIG. 1.—Frank C. Abnormal course of one of the posterior spinal arteries, causing pressure upon the eighth and ninth posterior spinal roots on the left side. Laminectomy April 29, 1911.

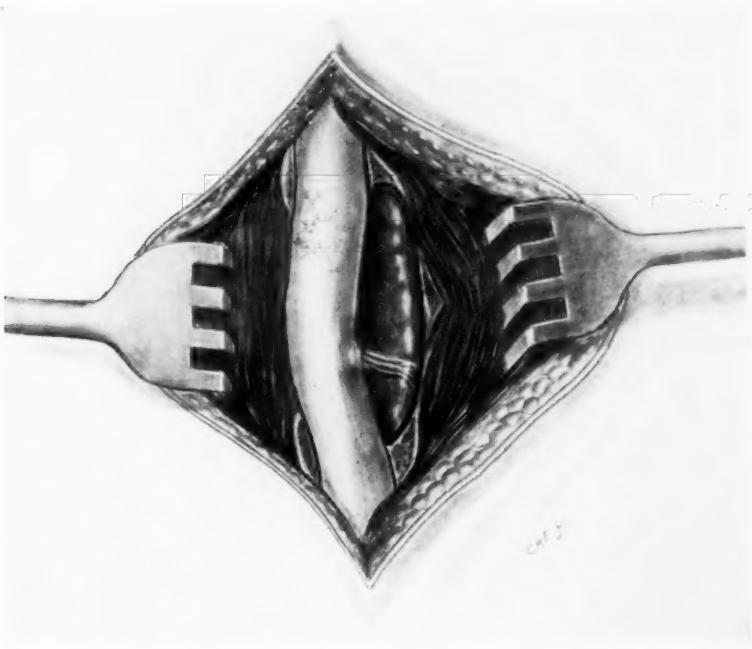

FIG. 2.—A. K. Extradural fibroma lying to the right and in front of the dura opposite the ninth, tenth, and eleventh dorsal vertebræ, pushing the dura and spinal cord to the left and causing most marked pyramidal tract symptoms on the left side. Removed February 14, 1914.

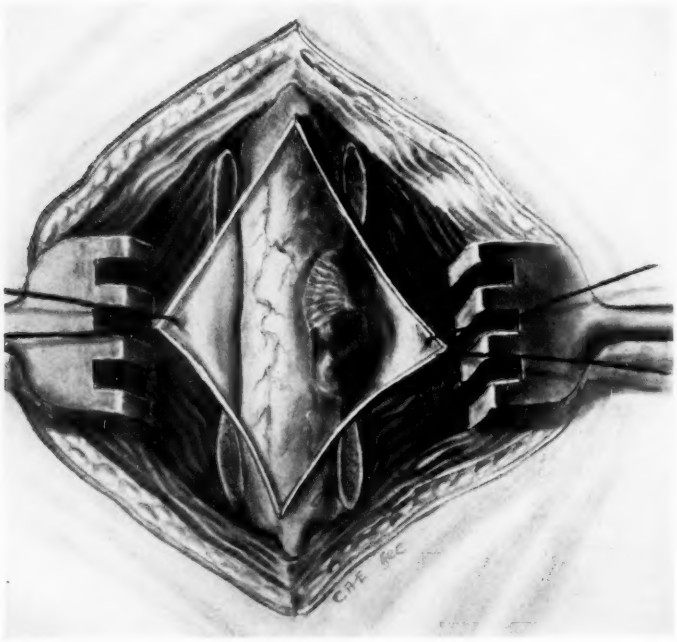

FIG. 3.—A. R. Extramedullary tumor at the level of the third dorsal segment which lies behind the dentate ligament. Removed February, 1914.

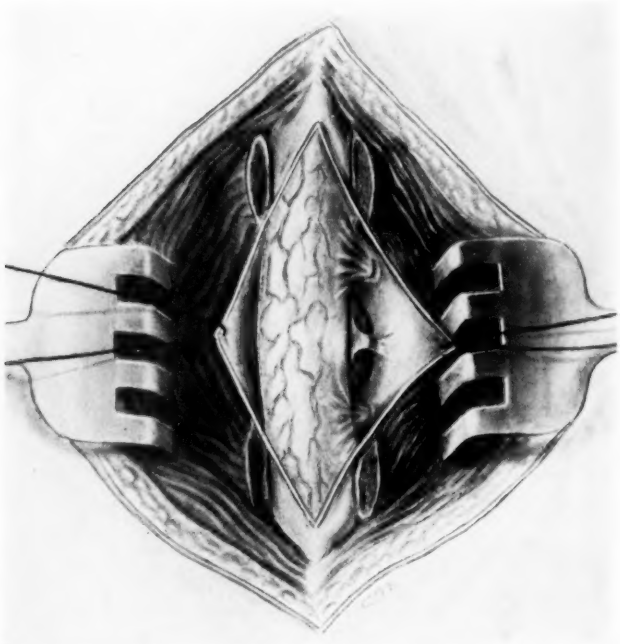

FIG. 4.—Mrs. O. Extramedullary tumor lying in front of the dentate ligament, and removed after division of the slip of the ligament.

FIG. 5.—J. W. Pediculated extramedullary tumor arising beneath the pia. Appearance of tumor when dura was opened.

FIG. 6.—J. W. Tumor withdrawn from the dural sac but still attached under the pia mater above. The entire tumor proper hung free in the spinal canal.

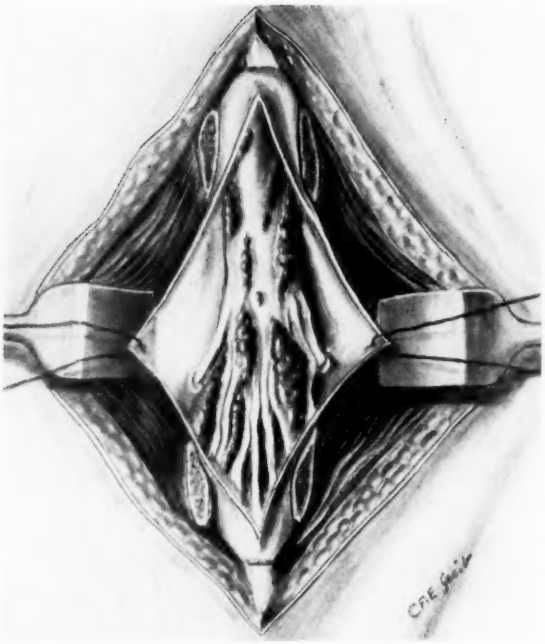

FIG. 7.—J. L. Multiple extramedullary tumors of lumbosacral cord and between the nerves of the cauda equina. This is a type of sarcoma which grows in the pia mater and rapidly spreads upward.

most motor symptoms. This is not always the case. In several instances I have operated and removed a tumor from a patient who presented both motor and sensory signs upon the same side, the side opposite to that on which the tumor lay (see Fig. 2). The motor symptoms on the contralateral side must be explained by pressure dislocation of the cord to the other side and pressure of the pyramidal tracts upon the walls of the spinal canal. In other words, the same thing occurs as in cerebellar growths of one side which press the cerebellar hemispheres to the other side and cause the facial nerve of the contralateral side to be pressed against the petrous portion of the temporal bone, giving a facial paralysis on the side opposite to that of the lesion.

Indefinite sensory symptoms with well-marked motor disturbances occur either in tumors on the anterior surface of the cord or with extradural tumors. In three instances of extradural tumors the sensory disturbances were not prominent and varied considerably from day to day.

Extramedullary intradural growths most often lie in one of three locations, either upon the posterior columns, a little more to the one or the other side, or on the lateral aspect of the cord, behind or in front of the dentate ligament, or upon the anterior surface of the cord (see Figs. 3, 4, 5, and 6). Tumors that lie in front of the dentate ligament will often cause little disturbance of the tactile sense but very marked diminution or loss of pain and temperature sense, and give symptoms very similar to those of intramedullary new growths. In several patients, in whom after a careful inquiry into the history of the disease and the sequence of symptoms, and after a number of painstaking examinations, the diagnosis of intramedullary disease had been made, an extramedullary tumor was found and removed at operation.

As my statistics show, the most frequent condition with which a spinal tumor was confused was inflammatory disease of the cord and of the roots of the cauda equina. After one has learned to differentiate between the clinical picture of a spinal new-growth and a meningomyelitis, and between the symptoms of tumor involving the roots of the cauda equina and a caudal neuritis, the mistakes in diagnosis should become much more rare. Thus in the last nine patients in whom the diagnosis of spinal tumor was made, in eight the tumor was found at the operation.

In all but one of the patients with tumor that I have operated upon, the growth was found at the operation; in several cases, however, several vertebræ higher than had been anticipated. In one patient the tumor was thought to be at the tenth dorsal level on account of distinct

sensory level symptoms. I failed to find the growth at this level. About one year later, there were symptoms referable to the first dorsal level, and at a second operation I removed a dural endothelioma at this level of the cord.

In most of my operations I followed the well-known rule, to expose the cord two vertebræ higher than the upper level of the sensory disturbances. I have, however, usually had to remove at least one spinous process and arch higher up, and I have recently made it a rule to make the middle of my exposure at least three vertebræ higher than the sensory level.

SPECIAL FEATURES OF THE TECHNIC

The spinal cord must be considered more delicate, if anything, than most parts of the brain. Its small size in which are crowded together groups of motor, reflex and trophic nerve cells and bundles of afferent and efferent nerve fibres, explains why the slightest trauma will be followed by extensive loss of function. The field of operation must be well exposed so that all manipulations can be accomplished without trauma to the cord. Such an exposure can only be obtained by means of a complete laminectomy, that is by the free removal of spinous processes and laminæ. The operation of hemilaminectomy may have its field of usefulness, but it is not the proper procedure when the search for a spinal tumor is to be made, or a spinal tumor is to be removed.

With the proper instruments and after some experience, the removal of the spinous processes and laminæ should be rapidly accomplished; in most cases three or four spines and laminæ of both sides should have been removed and the dura exposed within ten to fifteen minutes from the time of the skin incision. If this part of the procedure is rapidly done, operations in two stages will be rarely necessary, except in high cervical operations, or for the removal of intramedullary growths by the method of "extrusion."

The best results will be obtained by those surgeons who are careful not to handle the cord and who consider that every time the cord is touched, harm is done to it. The cord should never be grasped with the fingers or an instrument. If it has to be lifted up or drawn to one side, it is advisable to grasp a slip of the dentate ligament with a "mosquito" artery forceps, to cut the slip at its dural end and to make traction on the forceps. It is sometimes necessary to cut one posterior root and use it for traction purposes.

As soon as the tumor has been found, and its relations to the cord determined, its removal should be accomplished with the utmost gentleness. The growth must be grasped with an instrument, and slowly pulled away from the cord so that its connections with the cord can be seen, and fine adhesions carefully divided. The entire procedure should be accomplished without causing any hemorrhage. If the growth is intimately connected with the pia mater or with the cord itself, it is better to stop the operation for the time being, rather than to attempt to peel out the growth. Some subpial tumors are closely connected with the cord, and their attachments cannot be divided without causing considerable trauma to the cord tissue. If the actual removal of the tumor is delayed for a few days or a week, the relations of the tumor to the cord will be found to have become much less intimate. In such a case it is advisable to leave the dura open, to close the muscles, fascia, and skin carefully, and to wait for four to seven days before the second operation is done.

I shall not, in this place, give any detailed account of the method of treatment of intramedullary growths, but would refer the reader to a description of the technic of removal of intramedullary tumors published elsewhere. I must emphasize one point, however, regarding the "method of extrusion." An intramedullary tumor can only be removed, if it has been completely extruded from the cord. If it has not entirely extruded, it cannot be removed, and it would be a great technical error (of which I have once been guilty) to attempt to peel out the part of the tumor that still lies within the cord substance. In the patient referred to, great improvement followed the incision of the cord and extrusion of the intramedullary tumor. At the second operation I found a small part of the growth still embedded in cord substance. Very carefully and slowly I peeled out the small intramedullary mass but the patient was again paraplegic after the operation, and years elapsed before she recovered the power in her limbs.

RESULTS

The only patients in whom we may expect a complete recovery, and by a complete recovery I mean the disappearance of all of the symptoms and of all evidences of loss or disturbance of function, are those who are operated upon early in their disease. We cannot expect a patient who has been paraplegic for many months or years to recover entirely, any more than we can expect a patient who has had a marked long standing choking of the disc from a brain tumor to recover without

some postneuritic atrophy. If the diagnosis is made early and the operation not delayed, complete recovery will occur within a short time, often only a few months. If more or less marked motor and sensory loss has existed, it may take years before all of the signs disappear, and some signs, such as ankle clonus, exaggeration of some reflexes, etc., may remain. If the pressure upon the cord has existed for many years, the cord may have been so much injured that improvement is impossible. Even if the pressure has existed for a number of years, however, considerable return of power and sensation may occur, although it may require many years for the improvement. There is nothing more unfortunate than to have a patient remain paralyzed, after the removal of an extramedullary growth has been easily accomplished, because the diagnosis was not made early enough. I have under my observation at the present time two patients from whom I removed extramedullary tumors a few months ago. One of the patients had symptoms for nine years, and the other had been paraplegic for six years. In both of the patients there has been some return of sensation in the lower extremities, but the paralysis had persisted, and I consider it doubtful whether power in the lower limbs will ever be regained. The real nature of their disease should have been recognized many years before.

Of the 32 spinal cord tumors that I have operated upon, two patients died as a direct result of the operative procedure. Both patients had intramedullary growths in the cervical region. In one patient, who was operated upon in very poor condition with respiratory and cardiac disturbances, an intramedullary tumor was removed from the fourth to sixth cervical segment by incision of the cord. The patient died from respiratory paralysis four hours after the operation. The second patient was operated upon for an intramedullary growth extending above the second cervical segment. The cord was exposed and incised and the tumor left to extrude. The patient died from respiratory paralysis on the second day after the operation, and the post-mortem examination showed that I had operated upon an infiltrating growth of the medulla oblongata and cervical cord, and that a large part of the tumor lay on the dorsal surface of the medulla in the posterior cranial fossa. The condition was, of course, an entirely hopeless one.

In considering the final results in the remaining 30 patients I shall speak of extramedullary and intramedullary tumors separately. Of the seven patients who survived after the removal or attempted removal of the intramedullary tumors, two have almost completely recov-

ered so that the patients are able to be up and about without assistance, and have returned to their work; two others have been slowly improving so that we may hope for a satisfactory recovery. At the present time (one and two years after the operations) both are able to get about with crutches and canes. Two patients died about six and eight months after the operation. Both of these patients had infiltrating growths which were not removed. Finally, one patient was operated upon two weeks ago, but the actual removal of the tumor has not yet been done. In short, of the nine patients with intramedullary tumors, the final result will be satisfactory in four; in two, the tumor could not be removed; two died as a result of the operation; one was recently operated upon.

Of the 23 patients with extramedullary growths, two must be excluded because they had multiple tumors which could not be removed; both patients died some months after their operations (see Fig. 7). Two others died several months after they had been operated upon and in both patients it was found that the spinal growth was a metastasis from a tumor in another part of the body. Three patients had giant tumors which surrounded the conus and the nerves of the cauda equina and could not be radically removed. One of the patients improved very markedly after the operation, while the others remained unimproved (two, three and four years after the operation). These cases are reported in detail in a paper by Dr. Collins and the writer (*Amer. Jour. Med. Sci.*, April, 1914).

Of the remaining 16 patients, four were recently operated upon (two to four weeks since operation) and of these four, two have already shown marked improvement and will probably recover entirely; the other two patients have thus far improved but very little. There remain, therefore, 12 patients from whom extramedullary tumors were removed more than four months ago. Six of these patients are entirely well. They are free from all of their former symptoms and upon physical examination it is difficult to find the slightest evidence of the disease they had suffered from. In three other patients there has been great improvement, so that they are able to be about and attend to their work, although they still have sensory and motor disturbances. Finally, there were three patients who had had a complete paraplegia for a long period before the operation (four, six and nine years). One of these patients was operated upon about two years ago; she never regained the control over her limbs, and succumbed to bed-sores about one year after her operation. The other two patients

were operated upon about four months ago (six and nine years paraplegia) and they have not, and probably will not, regain any motor power.

Thus, according to my experience, the danger of a laminectomy for spinal neoplasm is small, the results that may be expected from the removal of intramedullary tumors of the cord fairly good, if the tumors are well localized and will extrude; the results from the removal of extramedullary growths very satisfactory if only the patients come to operation early enough, before irreparable damage has been done to the cord.

ANEURISM OF THE SCIATIC ARTERY*

By Robert C. Bryan, M.D.
of Richmond, Va.

The sciatic artery springs from the anterior trunk of the internal iliac and emerging through the great sacrosciatic foramen, between the pyriformis and coccygeus muscles, runs down the posterior aspect of the thigh parallel and slightly internal to the sciatic nerve. Aneurism of this artery is 3½ times less frequently observed than in the gluteal, which is about the same size normally and situated more superiorly and internally. This condition is relatively rare, there being but 24 cases recorded.

Case I (Guelliot, 1895. Anévrysme de l'artère ischiatique. *Bull. Soc. méd. de Reims,* n.s., v. 1, p. 31).—Man aged eighty, fell on buttocks and presented later a large descending ecchymosis as far down as the popliteal space and also down the penis. Ecchymosis gradually receded but the swelling persisted and the leg remained engorged. The tumor was as large as an infant's head; no pulsation. Incision of tumor. Clots of fibrin removed; bleeding soon refilled it however. An aneurismatic pouch was found at the level of the sciatic notch. It is probable that the aneurism was caused by fracture of the ischium incurred by the fall. Ligation and recovery.

Case II (D'Antona, A., 1897. Un caso di aneurisma bilaterale nontraumatico della grandi sciatica. Ligatura dell' ipo-gastrica. *Atti. d. r. Acad. med. Chir. di Napoli,* n.s., v. 51, pp. 278–279).—Male aged fifty-two, negative history for syphilis. In 1890, he had attack of rheumatism. In 1895, pain in region of coccyx. In December, 1896, he observed a foreign body or tumor in right nates, size of a nut. It enlarged rapidly and became pulsatile. Incision near anterior superior iliac spine, location of common iliac, isolation and ligation of the hypogastric artery. Later he observed an aneurism the size of an almond in the left sciatic artery. He promptly applied the galvanic current and he is of the belief that the progress of the tumor was arrested.

Case III (Wood, W. C., 1899. Traumatism of the Sciatic Artery Causing Aneurysm. *Brit. M. J.,* Lond., v. 1, March 18, pp. 661–662).—Well-nourished woman, fell on fender about six months ago, injuring right buttock. Pain in the region of the tuber ischii at the time. Pain has been increasing ever since. Noticed a swelling in right buttock about six weeks before admission to hospital (St. Mary's, London), and this tumor has been increasing gradually. Has had rheumatic fever, but no other illness.

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*Read before the Sixteenth Annual Meeting of the Tri-State Medical Association of the Carolinas and Virginia, in Wilmington, N. C., February 18–19, 1914.

Examination showed woman lying on left side with right leg moderately flexed; patient suffering pain referred to right buttock, but also extending down the thigh. Pulsation was plainly visible through the clothes. Buttock was much enlarged, pulsating; pulsation most marked a little above the gluteal fold. The superficial veins were prominent over the swelling. Steady compression caused diminution of the tumor, but it quickly regained its former size when released. Loud systolic bruit was heard over the whole area of the pulsation, and over its posterior part there was also a diastolic bruit; some numbness of the toes, no complete anæsthesia; a tendency to footdrop, but no paralysis.

On September 30, 1898, incision about 8 inches long was made over the swelling parallel with the fibres of the gluteus maximus. The muscle fibres separated and sac exposed. Estimated to hold about 14 ounces of blood; shape fusiform; and it extended from the sciatic notch downward behind the great trochanter to beyond the gluteal fold. It was separated from the surrounding structures without difficulty. The separation was about completed when the sac ruptured and half a pint or more of blood escaped. Tumor was grasped by Mr. Silcock with his right hand and the hemorrhage controlled to a considerable degree. Pedicle clamped and bleeding stopped. Sac was freely opened and its cavity packed with cyanide gauze. The upper end of the sac having been dissected out, a stout silk ligature was tied around the feeding artery and the mouth of the sac. The ligature unfortunately included the sciatic nerve, which, being firmly imbedded in the sac wall, and actually forming part of it, could not be freed. Patient lost about a pint of blood during the operation. Patient improved and was dismissed December 13, able to get about on crutches. There was complete motor paralysis of the foot and rather more on the outer half of the dorsum, including the four outer toes, extending up to the outer side of the leg to just below the knee, reaching to the middle line posteriorly, and rather to the outside of the middle line anteriorly; œdema of dorsum of foot and leg nearly to knee.

Examination of aneurism; short oval sac, 3¾ by 2¼ inches. Afferent artery enters on deep surface at upper end of sac. The efferent artery leaves on the deep surface about midway between the upper and the lower ends; it is completely fused with the sac as far as the lower end. The great sciatic nerve is represented by one stout strand of nerve bundles about the size of an average median nerve, on the deep surface of the sac, and on the superficial surface by two thin ribbons in which the nerve bundles are much separated. They are all intimately connected with the sac.

Case IV (Dutton, H. R., 1905. Gluteal Abscess with Aneurism of the Sciatic Artery. *Indian Med. Gaz.*, Calcutta, v. 40, p. 218).—Native Kuviraj, aged thirty, admitted to Cantonment Hospital, suffering from pain and swelling in right buttock. Carried to hospital, since he could not walk or stand, as he was unable to flex his thigh. Had suffered for two months. Said he never had fall, strain or other injury. No signs or history of tuberculosis.

Right buttock was found considerably enlarged; swelling greatest between great trochanter and ischial tuberosity, and extended within an inch of the iliac crest. Sense of heat present, and he complained of severe pain on pressure. Fluctuation obtained with difficulty. Thigh rigid and extended. Temperature 100°. Incision and removal of quantity of slightly sanious pus; while exploring a gush of bright red blood occurred and wound was packed with gauze, as patient's con-

dition did not permit any further interference. About 32 hours after operation, complained of great pain, so he removed packing, irrigated the cavity and repacked it. Sanious discharge continued, and on the eighth day another hemorrhage; packed again; hemorrhage recurred; decided to cut down and tie the gluteal artery if he could not find the bleeding point; tied gluteal artery, but bleeding continued. Found a sacculated aneurism of the sciatic artery about the size of pigeon's egg. Clamped sac with two pairs of Spencer Wells forceps and hemorrhage ceased. Two days later all discharge ceased; forceps removed after 36 hours; patient discharged completely cured 18 days after second operation, with full use of leg again.

CASE V (BAJARDI, DANIELE, 1898. Aneurisma spontaneo dell' A. ischiatic destra. Legatura centrale e periferica ed escissione parziale del sacco. Guarigione. *La Settimana med. d. Sperimentale,* Firenze, v. 52, 22 gennaio, No. 4, pp. 37–40).—Male, aged fifty-six, good family history, and previous personal history fair, alcoholic and hard smoker, good general hygienic habits. In September, 1896, he first noticed pain about the coccyx region and along the leg. Slowly a tumor developed and a year later, August, 1897, it was diagnosed as an aneurism of the right buttock by Dr. Nanni. An incision down to the sciatic artery showed an aneurism of that artery. Encountered some difficulty in separating the nerve from the aneurism. Ligation of proximal and distal end of the artery and removal of portion of the sac. Patient made a good recovery. By October, 1897, he was able to be about. No pulsation at the site of the operation; sensation had been restored; extension and flexor movements of the right foot were incomplete, however. A little equinus remained but he was able to walk five or six kilometres without any trouble.

States that he had collected from the literature ten true and three false aneurisms of the sciatic artery, eight traumatic and five spontaneous; they were treated: one by compression, one by galvanopuncture, two by injection of perchloride of iron, two by forcipressure, three by ligature of the hypogastric artery, and two by ligature of the primary iliac artery. Two cases were treated by expectant method, or simply palliative. Seven died, five were cured and one improved.

CASE VI (DUGAS, L. A., 1860. Aneurism of the ischiatic artery; ligature of this vessel, and subsequently of the primitive iliac artery. *Am. J. M. Sc., Phila.,* v. 39, pp. 572–573).—Male, aged twenty-two, first seen in March, 1857. Fell from tree when four years old, struck buttocks on rocky surface. About five years later he first felt a little tumor in the region of the tuberosity of the ischium, which has been steadily increasing ever since. Thinks it has been pulsating for several years.

Tumor as large as a goose egg on inner cheek of nates, near tuberosity of ischium, and extended upward and inward in the direction of the ischiatic artery. Firm pressure upon the seat of the ischiatic artery at its exit from the pelvis arrested both the pulsation and the whizz, and these returned when the pressure was omitted. Tumor never caused pain except when he rode horseback, or sat a long time upon it. Ligation of the ischiatic artery March 16. Did well until the twenty-fourth when he had a sudden hemorrhage from the wound while at stool. Lost about a quart of blood before it could be stopped. Ligation of the common iliac artery was done, but patient died from exhaustion. No autopsy.

CASE VII (STEVENS, W., 1814. A Case of Aneurism of the Gluteal Artery, Cured by Tying the Internal Iliac. *Med. Chir. Tr.*, Lond., v. 5, pp. 422–434).—Maila, negro woman, imported from Africa into the West Indies in 1790, was first seen in December, 1812, with tumor on left hip over sciatic notch. It was nearly as large as a child's head and pulsating strongly. Had commenced about nine months before with slight pain. Diagnosis was aneurism of the gluteal artery. Ligated the internal iliac artery about one inch from its origin. The tumor disappeared almost immediately after operation and the wound healed readily. At the end of the third week the ligature came away and in six weeks the woman was perfectly well.

Owen, Richard, 1830. An account of the dissection of the parts concerned in the aneurism for the cure of which Dr. Stevens tied the internal iliac artery, at Santa Cruz, in the year 1812. *Med. Chir. Tr.*, Lond., v. 16, pp. 219–235. The woman operated on by Dr. Stevens in 1812 died in 1822 from chest trouble and Stevens had occasion to remove the anatomical parts related to his ligation of the internal iliac artery and brought them to the Museum of the Royal College of Surgeons. Examination showed that the internal iliac artery had become impervious at the part where the ligature had been applied; and he also found that the ischiatic artery was continued, in the character of a ligamentous cord, to the place of its exit from the pelvis, but that the gluteal artery was pervious at its origin. Here he discovered for the first time that the aneurism had been in the sciatic artery and not in the gluteal as he had thought.

In discussing a second operation on the internal iliac artery performed by Atkinson of York, he states that in his opinion this was also a case of aneurism of the sciatic artery. Male, aged twenty-nine, was operated on for gluteal (?) aneurism on May 12, 1817; was many days relieved from the distressing pain of the tumor; about the tenth day clots were extruded from the tumor wound and patient died from complete exhaustion May 31, 19 days after operation. On dissection, the ligature was found to be disengaged, the knot including a small fragment of (apparently) the artery; the internal iliac was completely separated. . . . "That the internal iliac was actually secured in this case, there can be little doubt; and if the vessel had been in the same healthy condition as in the negress Maila, the operation might have been attended with equal success. It is to be regretted that the nature of the disease in the coats of the vessel is not mentioned; and with respect to the seat of the aneurism, as it does not appear that the vessel from the distal side of the sac was traced in this dissection, nor any of the sound branches of the internal iliac artery, and considering the direction in which the bougie was passed down the internal iliac into the aneurismal sac, I am inclined to suppose that the aneurism in this case was also of the ischiatic artery."

CASE VIII.—Richard Owen refers also to a case operated on by S. POMEROY WHITE, of New York (Successful Case of Ligature of the Internal Iliac Artery) for the cure of gluteal aneurism (*Am. J. M. Sc.*, 1828, Art. 5, p. 304), where the operation was crowned with success, but Stevens, while in the United States, saw White, and was convinced that in this case also the aneurism was of the ischiatic, and not of the gluteal artery.

CASE IX.—Case of J. Van Volkenberg, aged sixty, trade of tailor, came to Hudson for surgical advice, October, 1827. Had a tumor size of child's head, located on left hip, directly over the sciatic notch. Stated that it was of ten

months' standing and that he experienced no pain from it. History of repeated attacks of rheumatism.

Skin was found discolored, fluctuation perceptible; no pulsation. Supposing that pus was contained in the tumor, incision was made with the result that bloody fluid escaped. Probe was inserted and an aneurismal sac was found about five inches deep; the walls of the sac were found very thick and unyielding. The orifice was closed, but filled with blood and the tumor reassumed its usual dimensions. Ligation of the internal iliac artery was suggested and done and patient made slow but progressive recovery.

CASE X (TILLAUX, 1879. Sur un cas d'anévrysme traumatique de l'artère ischiatique. *Bull. Soc. de Chir. de Par.*, n.s., v. 5, pp. 419-420).—Male, aged twenty, seen August, 18, 1878, having fallen down four steps; external bruises and fracture of thigh. On the fifth day pain was noted in right trochanter and examination revealed a gluteal tumor. Pains became violent and morphine was required for relief. Deep fluctuation led to diagnosis of abscess. Incision caused a stream of blood to flow; recognized his error and promptly made an incision down to large trochanter and sacrum. Found the source of the bleeding in the sciatic notch. The sciatic artery was involved. Seized the artery with forceps, applied three ligatures. Forceps were left in place for 48 hours. Patient made good recovery.

Tillaux was convinced that he had an ischiatic aneurism which he had mistaken for hot abscess.

CASE XI.—NICAISE in the discussion of the above stated that he observed a similar case in a man, aged forty, about 2 years ago. This man had fallen on his buttocks and in a short time there appeared a tumor of large size and painful. Pain grew worse and, finally, paralysis of the affected leg (does not state whether right or left leg) caused him to cut down through the nates and remove clotted blood from a sac at the bottom of which he found a bleeding vessel, gluteal or one of its branches, located right in the sciatic notch. Forceps applied for 48 hours. Cure by secondary union in 20 days. Every trace of the paralysis had disappeared.

CASE XII.—ANGER adds a third case in a young woman who had sustained a fall on the nates, followed by bloody effusion and inflammation; abscess suspected; physician incised and blood squirted out. Anger was called and made a diagnosis of aneurism of the sciatic artery. Ligature of the internal iliac. Death. Autopsy showed rupture of the sciatic artery in sciatic notch down to base of pelvis.

CASE XIII (NÉLATON. *Gaz. d. Hop. de Par.*, No. 36, p. 141, 27 mars, 1862; Richet, 1865. *Nouv. dict. de méd. et de chir.*, v. 2, p. 337).—Russian officer, aged forty-two; arteriovenous aneurism of ischiatic artery, size of fist, marked pulsation, constant bruit; two flaps on gluteal region and in pelvis felt through rectum. Recognized later by Nélaton as aneurism of the gluteal artery. In 1861 injection of iron chloride, repeated in 10 days. Cure. Richet asks the question whether it was gluteal or sciatic. In March, 1864, no sign of tumor.

CASE XIV (BAUM, 1859. De laesionibus aneurysmatibusque arteriarum glutaeae et ischiadicae. Accedit descripto aneurysmatis per anastomosin dictarum arteriarum liquoris ferri sesquichlorati injectione sanati. *Diss. Berlin.*)—Female, aged thirty-two, aneurism per anastomosis of gluteal and sciatic artery, began four years ago when she was taken in the fifth month of pregnancy (2nd). Three

years ago during the third pregnancy it was the size of fist; and 18 months ago during the fourth pregnancy, it had grown still more. Aneurism occupies the greater portion of the left gluteal region, covered with one nævus and six varices. Pulsation, whirring, possible dilatation of the common pudendal. On November 10, 1858, injection of ferri sesquichloride. Cure confirmed 8 years later.

Case XV (Sappey, C., 1850. Anévrisme de l'artère ischiatique; ligature de cette artère. *Gaz. d. hop. de Par.*, 3 s., v. 2, pp. 105–106).—Male, aged fifty-five, left sciatic aneurism. Fell on nates at age of twelve years, 14 days later there was observed a nut-sized, painful and non-pulsatile tumor; remained for 10 years. At age of twenty-two the tumor was hen-egg size, pulsatile, remained so for ten years more. At age of thirty-five sudden increase to size of two fists, painful. Aneurism lay over tuber ischii, pulsatile and bruit noted. August 27, 1849, compression for 14 days was found to be useless; then ligation of the sciatic artery (Anel); aneurism grew again; pulsation returned; was the same two months later, but painless.

Conclusions: In aneurisms of the ischiatic artery he prefers to open the sac after the method of Anel.

Case XVI (Nélaton, 1864. Anévrysme de l'artère ischiatique. *Gaz. d. hop. de Par.*, 19 mars, pp. 130, 178).—Sappey's case recurred in 1864. Aneurism size of fist noted on inferior portion of sciatic artery. On March, 1864, injection with ferric chloride. Anticipates radical cure. A month later the patient was improving markedly.

Case XVII (Riberi. *Opere minori*, v. 1, p. 326).—Male, peasant, aged twenty-five years; varicose aneurism of sciatic artery of right nates. Was injured with a scythe about a year previously. Considerable hemorrhage which was arrested by pressure. Pulsatile tumor developed along course of sciatic, interferes with walking. In 1833 compress applied for 3 months. Recovery. In 1838 the tumor was as before; compression again. Improved again (reported the case in October, 1838).

Case XVIII (Balsius, E. (Dr. Halle), 1859. Eigenthümlicher Schmerz beim Glutäal-Aneurysma., *Deutsche Klinik*, No. 11, pp. 10–106).—Male, aged fifty, circumscribed aneurism of the sciatic (ischiadica). Injured while riding in saddle. Tumor hen-egg-sized for over a year opposite incisura ischiadica. Severe pain along sciatic nerve. At first supposed to be abscess, pulsation confirmed the diagnosis. In 1849 galvanopuncture with too weak current and too short treatment. Died from cholera before treatments were finished. Autopsy not obtained.

Case XIX (Ruyer, 1845. Anévrisme de l'artère ischiatique gauche pris pour un anévrisme de la fessière; mort. autopsie. *Gaz. méd. de Par.*, v. 13, pp. 184–185).—Female, aged sixty-six; robust; aneurism of the left ischiatic artery due to a fall on buttocks in 1821; small painful tumor; in 1825 she sustained two falls on nates; pain, hen-egg-sized tumor, pulsatile. In November, 1825 (time of report), operation was contra-indicated, due to weakness, age, and size of the tumor. Palliative treatment with morphia and digitalis; fever and severe pain in leg. Died February 3, 1826. At autopsy Rouisson held that it was an aneurism of the sciatic artery.

Case XX (Hilton, Fagge C., 1864. Case of aneurism seated on an abnormal main artery of the lower limb. *Guy's Hosp. Rep.*, 3 s., v. 10, pp. 151–157).—Widow, aged forty-eight, fat; good health up to three months ago when she

began to complain of a dull, aching pain in middle and posterior part of right thigh, which gradually increased in severity. Leg began to swell ten days ago. Patient could not move about. Pain at inner and lower part of tuber ischii; some hardness and swelling; pain also shot into vagina and labia; suggillations, severe pain; formication; deafness, diarrhœa, weakness. Died September 23. Autopsy showed ruptured aneurism of the sciatic artery which runs posteriorly on femur down to popliteal space, above between tuber ischii and trochanter major.

Case XXI (Kade, E., 1876. Aneurysma der Art. ischiadica. Unterbindung der Art. iliaca communis sinistra. *Petersb. med. Wchnschr.*, v. 1, No. 8, pp. 2–5).—Male, aged fifty, gave history of tumor on left nates for a year, but no history of fall or other injury. Tumor caused pain, interfered with locomotion and work. Two months ago he experienced a sensation as though something had burst, tumor increased in size at its original site and extended down to calf of leg, and both malleoli felt hot and gave rise to constant pain. Examination, July 2, 1874, showed pulsatile tumor, left buttock larger than right, upper thigh also larger than right. Diagnosis of aneurism of sciatic artery was made.

Elevation of leg and ice applied constantly. No improvement. July 15, 1874, ligature of left common iliac artery. Removed about 7 pounds of coagulated material from sciatic aneurism; this was followed by bleeding from sac. Tamponade with sterile gauze. Died three hours later. Autopsy showed that ligature was complete and perfect, and bleeding from aneurismal sac must have come from anastomotic source. Patient died from exhaustion, although the bleeding had been effectively stopped by packing the wound.

Case XXII (Cianflone, 1875. Legatura dell' arteria iliac intera per ferita di un ramo della glueta. Reported by Pasquale Landi. *Lo Sperimentale-Firenze*, v. 35, pp. 121–147).—Female, aged forty, admitted September 29, 1851, to Ospedale degli Incurabili; spontaneous aneurism of left nates size of head of child, calling for ligature of hypogastric artery. Died 17 years later from gangrene abscess of pelvis. Autopsy showed that the sciatic aneurism occupied the ischiotrochanteric space.

Case XXIII (Montaz, Léon, 1891. Des anévrysmes de la region fessière. *Congres Franc. de chir.*, Par., v. 5, pp. 444–448).—Male, aged thirty-five, entered hospital three years ago, complaining of painful tumor in right gluteal region. This tumor had increased in size and was situated at iliotrochanteric line, size of fist. Pulsatile, hard, round tumor; both systolic and diastolic murmur or bruit. Diagnosis of arterial aneurism of sciatic region in man with sclerotic arteries. Injection of half Pravaz syringeful of ferric chloride into aneurismal sac. Thrombosis of leg; dry gangrene of foot; disarticulation à la Chopart. Good recovery. Aneurism grew progressively smaller and symptoms disappeared. Patient was able to get along very well with his stump.

Case XXIV (D'Antona, 1903. Caso di aneurisma bilaterale omonimo delle due ischiatiche. Legatura delle due ipogastriche. Guarigione. *Arch. Internat. de Chir.*, Gand, v. 1, pp. 69–73).—Rare case of bilateral aneurism of both sciatic arteries in male, aged fifty-two. In 1896 he observed sensation as of foreign body in right nates; tumor size of a nut, pulsations. In December, 1896, œdema of right foot. Tumor limited to sacro-iliac synchondrosis and large trochanter, external margin of glutei and large sciatic notch. Systolic bruit pronounced. Ligation of the hypogastric artery. The aneurism rapidly diminished

in size. Recovery by the seventeenth day. On February 10, similar tumor and pulsation in left side noted. For three weeks galvanic current; dismissed March 16, 1897. At the end of 1901, symptoms returned; pain was then very severe. In July, 1902, ligature of the left hypogastric artery, good recovery.

Operation	Year	Sex	Age	Etiology	Operation	Result
Guelliot	1895	M.	80	Fall	Ligation sciatic	Cured.
D'Antona	1897	M.	52	.....	Ligation hypogastric	Arrested.
Wood, W. C	1899	F.	...	Fall	Ligation sciatic	Recovery with paralysis.
Dutton, H. R	1905	M.	30	.....	Clamp sciatic	Cured.
Bajardi, D	1898	M.	56	.....	Ligation sciatic	Recovery and paralysis.
Dugas, L. A	1860	M.	22	Fall	Ligation common iliac	Death.
Stevens, W	1830	F.	...	.....	Ligation internal iliac	Recovery.
Atkinson	1817	M.	29	.....	Ligation internal iliac	Death.
White, S. P	1828	...	...	.....	Ligation internal iliac	Recovery.
Van Volkenberg	1827	M.	60	.....	Ligation internal iliac	Recovery.
Tillaux	1879	M.	20	Fall	Ligation sciatic	Recovery.
Nicaise	....	M.	40	Fall	Ligation and incision	Recovery.
Anger	....	F.	...	Fall	Ligation internal iliac	Death.
Nélaton	1865	M.	42	.....	Injection ferri chloride	Recovery.
Baum	1859	F.	32	Pregnancy	Injection ferri sesquichloride	Recovery.
Sappey, C	1850	M.	55	Fall	Compound ligation sciatic	No cure.
Nélaton	1864	...	...	.....	Injection ferri chloride	Improved.
Riberi	1833	M.	25	Blow	Compression	Improved.
Blasius, E	1859	M.	50	Riding	Galvanopuncture	Death.
Ruyer	1845	F.	66	Fall	Medical	Death.
Hilton, F. C	1864	F.	48	.....	.....	Death.
Kade, E	1876	M.	50	.....	Ligation common iliac	Death.
Cianflone	1875	F.	40	.....	Ligation hypogastric	Death.
Montaz, Léon	1891	M.	35	.....	Injection ferri chloride; gangrene; amputation	Recovery.
D'Antona	1903	M.	32	Bilateral aneurism	Ligation right hypogastric; ligation left hypogastric	Recovery.

An analysis of the above series shows: 7 females; 18 males; youngest 20 years, oldest 80 years.

Injection ferri sesquichloride	1 case.
Injection ferri chloride	3 cases.
Medical treatment	1 case.
Compression	2 cases.
Clamp sciatic	1 case.
Galvanopuncture	1 case.
Ligation common iliac	2 cases.
Ligation hypogastric artery	4 cases.
Ligation internal iliac	5 cases.
Ligation sciatic artery	5 cases.

No improvement	1 case.
Recovery with paralysis	2 cases.
Recovery with amputation	1 case.
Improvements	3 cases.
Deaths	8
Recoveries (one case bilateral)	11

To the above cases I wish to add:

CASE XXV (Bryan).—A boy, L. A., twenty-two years old, colored, was referred to me by Dr. George Ross of this city in December, 1913. Examination showed a rather anæmic, thin mulatto, who, unable to sit down, was lying on his bed upon his right side with the left leg and thigh flexed and supported by pillows. He complained bitterly of pain down the back of the thigh, in the knee, and foot, which had required generous doses of opiates to relieve him. It was interesting to get his history, for being a waiter he migrated with the seasons between the Canadian border and the Gulf States. Early in October previous to his injury, while *en route* by boat from Portland to Florida to take up his migratory duties, he went to sleep on deck. In the night a severe storm came up and he was tossed about for some time before being awakened by a sharp blow over the left gluteal region, which made him sore for two or three days. This soreness gradually disappeared and it was not until November that he noticed an enlargement and stiffness about the spot where he had received the blow.

The family and previous personal histories were negative. He denied any venereal taint; no Wassermann was taken. The lungs were negative, temperature normal, there was no murmur of the heart, although a slight accentuation of the second aortic was noted. No blood count was made and there was nothing of any significance about the urinalysis. Rectal examination was likewise negative.

On inspection the left gluteal region posteriorly showed a large swelling shading off into the tissue both above and below. It was extremely tender, so much so that the tumor could not be mapped out, although a distinct pulsation and a moderate thrill could be elicited. The skin was glazed and reddened from numerous applications, the gluteal fold was smoothed out and on the first appearance it seemed as if an extensive suppurating cellulitis of the left nates was the cause of the trouble. Percussion was unsatisfactory. Auscultation gave a moderate systolic bruit synchronous with the heart.

The diagnosis seemed to lie between aneurism and hygroma. On account of the rapid development and the history of trauma, aneurism of the gluteal artery was suspected.

On operation a wide curved incision was made, starting above the trochanter major of the left femur, and running with the gluteal fold as far as the inner margin of the buttocks. The tendon of the gluteus maximus was severed and thrown back with the skin. The tumor could now be felt lying in the notch between the tuber ischii and the great trochanter, as a fusiform, pulsating aneurism springing from the sciatic artery. Some of the inner fibres of the gluteus medius were now severed, the long axis of the tumor was vertical, the upper pole emerging into the sacro-iliac foramen, having displaced the muscles and tissues there upward and separated the notch considerably. Along the inner margin and over the posterior wall of the aneurism were stretched the thinned-out fibres of the sciatic nerve to the width of about 2–2¼ inches.

The fibres of this nerve were collected, dragged to the inner side, the tumor dissected free from above, and tied off as closely as possible, well into the notch; the inferior pole being more easily reached was likewise tied off double, and tubes were put in the large space for drainage left by the removal of the tumor.

The aneurism measured 8 inches in circumference at its largest diameter and 9¼ inches about its bipolar circumference. Both the afferent and efferent stems were on a posterior plane to the sac which was symmetrical, dense and adherent (see Fig. 1).

The patient developed an infection which kept him in the hospital altogether for five weeks; he ultimately made a perfect recovery and left the hospital with no paralysis and perfect use of the leg.

It has been noted that both spontaneous and traumatic aneurism of the sciatic artery occur more frequently in the male than in the female in proportion of two to one. Most of the patients are between 20 and 40 years of age in the laboring class and apparently otherwise healthy. It has also been established that aneurism of the sciatic artery occurs more often on the left side than on the right.

D'Antona emphasizes the following: A line between the top of the great trochanter and posterior inferior spine of the ilium is a distinct landmark and separates gluteal aneurism which lies above, from sciatic aneurism which lies below this line.

He also calls attention to the location of the bruit in reference to this line.

D'Antona further states that a differential diagnosis between aneurism of the gluteal and sciatic artery is at all times difficult and in most instances impossible.

FIG. 1.—Aneurismal sac, one-half size.

Fischer says that aneurism of the gluteal lies high, as a rule, above the tuber ischii and to its inner margin, while that of the sciatic is deep, and at, or below, the level of the tuber ischii.

Fischer also calls attention to the fact that with marked pulsation of the tumor along the posterior border of the femur, increased thickness of the deep femoral and low pulse of the cruralis, one should bear in mind a possible ischiatico-popliteal aneurism.

D'Antona lays particular emphasis on an early neuralgia, in cases of aneurism of the sciatic artery, on account of its normal anatomical relationship to the larger sciatic nerve. This obtained markedly in the writer's case and appears to be a strong diagnostic symptom for aneurism of the sciatic artery.

He also refers to the hard œdema which goes along with sciatic aneurism and which is produced by a vasomotor paralysis or vasodilating excitation which is not noted in the gluteal aneurism.

Traumatic aneurisms, following stabs, gunshot wounds, or a fall, may be diffuse, circumscribed or varicose and are more rare than the spontaneous aneurism, whose history is negative to any injury but, in a certain percentage of cases, goes on to the formation of anastomotic aneurism.

Fischer, George (Die Wunden und die aneurysmen der Arteria glutea und ischiadica. *Arch. f. Chir. Langenbuck,* Berl., v. 11. pp. 762–838), states that the differential diagnosis between aneurism of the gluteal artery, abscesses, cysts, and cancer, is always difficult and in some cases impossible.

Diagnosis of aneurism of the sciatic artery must be based mainly on the complex of pulsations, bruits with aneurismal character, and sciatic pains which can be brought out in this region. Differential diagnosis should consider abscesses, hygroma, sciatic hernia, gumma, cancer (markschwämme) and pulsating sarcoma.

Abscesses: In this region abscesses may be deep-seated, arising in the sciatic space by retroperitoneal involvement and extruded downward through the notch from above, or, more rarely, by way of the bowel. The rectovesical fascia, however, would appear to be a sufficient barrier against the escape of suppuration from the ischiorectal space to this locality. The superficial phlegmons and cellulitis are to be recognized by local evidences with constitutional reaction. Rectal examination in both instances should be carried out.

Bursæ: Various authors describe 31 bursæ about the hip-joint. Those which may be justifiably confounded with sciatic aneurism are:

1. The bursa of the gluteus maximus, which is located between this muscle tendon and the great trochanter; inflammation of this bursa is

not uncommon, and gives rise to a doughy tumor behind the great trochanter with eversion and abduction of the thigh in contrast to the flexion and inversion of aneurism.

2. The bursa over the tuber ischii which is small, rarely involved, and points internal toward the anal margin along the lower fold of the buttocks.

3. The bursa of the gluteus medius developed in the tendon of that muscle as it runs over the upper and outer margin of the great trochanter. Inflammation here may be noted anterior and external to the trochanter.

Sciatic hernia: Garré gives two forms of sciatic hernia, the hernia suprapyriformis and the hernia infrapyriformis. In both the intestine protrudes beneath the gluteus maximus and is deeply buried.

Most sciatic herniæ occur in women past middle life. Beside the intermittent pain which goes hand in hand with all varieties of hernia, in this instance there is a tumor below the gluteus maximus which is *reducible* with subsidence of the pain. Not infrequently these herniæ point inward to the anal margin and even to the coccyx.

Gumma: Should always be suspected and a thorough investigation instituted.

Malignant growths of any type may arise in this region, as nearly every form of tissue is represented here. Of the many varieties, pulsating sarcoma offers the greatest obstacle to differential diagnosis. In myelogenous sarcoma, pulsations and bruits are not infrequently present. True aneurism of bone, however, is extremely rare. Klebs reports no such case. Vibrating or pulsating sarcomata are due to great vascularity and cystic degeneration.

The prognosis of aneurism of the sciatic artery is extremely profound. Spontaneous cure is not to be expected in any case. Very rarely does aneurism of this artery remain stationary. It may for a year or so, but fatal hemorrhage will result some time, and sudden rupture may cause death following a gradual asthenia. D'Antona has collected the figures of the mortality following ligation of the hypogastric artery and found it to be 40 per cent. The mortality of the cases in our series, surgical and medical, was 32 per cent.

The treatment must be surgical. Ligation of this artery was practised by Muzell as early as 1754 (*Med. u. Chir. Wahrnehmungen*, 2 Samml., 1 Aufl., 1754; 2 Aufl., Berl., 1772, pp. 37–39). He states that a musketeer had been stabbed in the gluteal region with scissors, resulting in the formation of an aneurism. Muzell cut down and ligated what he called the obturator artery, but Fischer feels assured that it was

the sciatic and not the gluteal artery as some other writers (Lisfranc, Velpeau, Boisson) seemed to think. Paralysis of the leg followed operation, but locomotion was completely restored in time, and Fischer is convinced that the paralysis was induced by injury to the sciatic nerve during operation. The fact of the proximity of this nerve would seem to further confirm his view.

Splitting of the sac with ligature of the sciatic, the hypogastric, internal iliac and common iliac arteries, galvanopuncture, injection with ferric chloride, compression, and Valsalva's clamps have each been tried in specific instances. The injection of ferric chloride is recommended by former writers as the best method of treatment on account of its simplicity, greater safety, less danger and shorter duration of confinement. According to these authors it gives stabile cures and has been found peculiarly efficient in various spontaneous arterial and anastomotic aneurisms of the gluteal artery.

With our present knowledge of asepsis, a surgical wound has none of its former terrors. It would not seem feasible or practicable to attempt, upon this unimportant, terminal artery, the finer surgical means for obliteration, such as suture, Halsted's gradual occlusion, or the use of his aluminum band, the Moore-Corradi wiring operation, or the Matas endo-aneurismorrhaphy.

The large death rate attending ligation of the common and internal iliac arteries would contraindicate this heroic measure until other means have been tried.

The sciatic artery, although deep-seated, is accessible by free incision. Excision of the aneurism should be attempted in each instance as the method of primary choice. The permanency of cure, liberation of the sciatic nerve, satisfactory results, and low mortality indicate, from a review of former cases, that this method will be attended with the most gratifying outcome.

DISAPPEARANCE OF RECURRENT MAMMARY CARCINOMA AFTER REMOVAL OF THE OVARIES*

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The remarkable changes, described by Beatson, which the removal of the ovaries brought about in mammary cancer, amounting at times to complete disappearance of the new growth, have also been observed by other surgeons, and about ten years ago the author reported a series of seven cases of his own. As a rule, the improvement, though striking, was but temporary; but in a few cases cures have been claimed.

The case presented to-day differs from the others in the fact that, when the ovaries were removed, the patient was not suffering from mammary carcinoma but from recurrent nodes in the skin and subcutaneous connective tissue that had appeared in the neighborhood of the site of an operation for carcinoma of the breast performed about four and one-half years previously.

Mrs. S., fifty-seven years old, was operated upon by me for carcinoma of the breast more than five years ago. The large area of skin transplantation visible now gives proof that the excision of skin was very extensive and that we had to deal with an advanced case. A scar extended up into the neck furthermore shows that the cervical glands were removed at the same time.

The patient returned to the German Hospital in March, 1913, suffering from fibromyoma of the uterus, and she was placed on the gynæcological division in the service of Dr. Gustave Seeligmann. On being examined she called attention to the fact that she had observed a number of nodes growing near the site of the former operation. The case was kindly shown to me and we saw the well-known characteristic picture of recurrent nodes, some of them larger than a finger tip rather close to the old scar, some smaller ones farther away. The larger ones were slightly reddened, the smaller ones had not changed color. At least a dozen of these were counted.

*Case presented before the Surgical Section of the New York Academy of Medicine, December 5, 1913.

> The question came up whether, in the presence of these metastases, it was worth while to operate upon the fibromyoma. On the basis of my former experience with Beatson's operation I expressed myself in favor of it. A panhysterectomy with removal of both ovaries was performed by Dr. Seeligmann, after which the patient made an uninterrupted recovery and left the hospital. We saw nothing more of her until December 3, about 8½ months after the operation, when a member of the house staff who had seen her, kindly referred her to me. Not a trace of the nodes can be found; they have completely disappeared.

In my series of cases formerly reported there was improvement in every case; in one of them the growth disappeared almost completely. The tumors, however, began to grow again after the lapse of six or seven months, sometimes sooner, in every case except one. In that case the tumor, which had been firmly fixed to the chest wall, became so loose that I performed the radical breast operation about two months after the removal of the ovaries. I saw that patient as late as fifteen months after the operation without any signs of a recurrence that I could detect. She was then suffering from severe headaches, and a few months later I heard that she had died suddenly. I am unable to say whether she died from a metastasis within the skull or from some entirely different ailment. It is possible, therefore, that there was one cured case among my former series.

The effect of castration upon mammary carcinoma had always been ascribed to some peculiar relation between the ovaries and the milk glands. The carcinomatous nodes in the present case were in the skin and subcutaneous tissue and had not appeared until more than four years after the breast had been removed. It had also been claimed by some that Beatson's operation is most likely to do good in women who are still in their menstrual life. In my former series, however, the best result, the almost complete temporary disappearance of the tumor, occurred in a woman who had passed the menopause. In this respect the present case stands in a rather unique position, for, although she is fifty-seven years old, she menstruated regularly up to the time when her ovaries and uterus were removed.

It seems that the operation of castration in these cases should not be entirely relegated to the heap of therapeutic rubbish, where most of us have placed it, but should be remembered in cases where we are unable to do anything better.

INJURIES OF THE GREAT TOE SESAMOIDS

By Kellogg Speed, M.D.
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A brief anatomical review of these small bone seeds (sesame) is necessary, as they are seldom considered either clinically or anatomically. They are more common in males than females and also in those of active muscular habit, and the ones under consideration beneath the metatarsal phalangeal joint of the great toe, while the largest in the human body with the exception of the patellæ, are but one set in the series of sesamoids found in the whole body.

The great toe sesamoids beneath the joint mentioned, like all sesamoids, develop in tendons which are subjected to great pressure over parts on which they glide. Their whole surface is invested by fibrous tissue derived from the tendon, except that area lying in contact with the part over which they play, namely, the upper surface which has an articular facet. On the plantar surface of the great toe metatarsal are two grooves, one on each side, for the sesamoids which develop in the tendons of the flexor brevis hallucis. The lower or plantar surface is convex, the upper surface is flat where they articulate in the grooves in the head of the metatarsal. A strong transverse ligamentous band unites them. From the lower surface this is smooth and forms a channel along which the long flexor tendon passes. The connection to the base of the phalanx is by strong fibres, much stronger than those to the metatarsal bone. Laterally they are bound to the lateral ligaments of the great toe joint and the sheath of the flexor tendons.

Causes of sesamoid injury are usually (1) direct violence due to a heavy object falling on the foot; (2) squeezing of the great toe joint between heavy masses; (3) falls from a height striking full weight on foot; (4) sudden increase in weight-bearing force when carrying heavy objects and missing footing with force expended through great toe joint.

When the foot and toe have been subjected to trauma or crushing, the injury to the soft parts or the toe alone may demand all attention. Such an injury would be cared for surgically and later, after it was healed, when the patient came to bearing weight on it, the tenderness at the base of the toe would increase with use and finally, if the efforts at use were persistent, end in disability. Physical examination reveals little, but by finding the same point of tenderness over the head of

FIG. 1.—Crushing injury, great toe. Note distal phalanx mashed and external sesamoid under metatarsal bone broken across. After soft parts healed, man had great pain beneath this joint and was disabled completely. Fragments slightly separated.

FIG. 2.—Side view of Fig. 1, showing the enlarged sesamoid. While this is the external bone its shadow can be seen greatly overlapping the normal bone and its pressure effect understood.

FIG. 3.—Sesamoids removed from this case. On the left side corresponding to the skiagram is the injured bone. View is of the plantar side and this enlarges the actual size about three times. Aseptic healing and painless resumption of function in foot followed in two weeks.

FIG. 4.—Fracture of internal sesamoid, left foot. This was by slipping while carrying weight, and is almost exactly transverse.

FIG. 5.—Side view of same. Note the greatly enlarged bone button which caused great pain and disability for several months before true condition was realized.

FIG. 6.—Fracture of internal sesamoid, right foot; due to squeezing violence.

FIG. 7.—Fracture of internal sesamoid, right foot. The shadow of the external is indistinct and it may also have been broken. Operation refused.

FIG. 8.—Side view of a case of internal sesamoid fracture Note separation of fragments and thickening of bone. Female.

the metatarsal by plantar pressure one may consider this fracture as possible and make a skiagram to give a positive diagnosis.

The upper surface being faceted and covered with a synovial-like surface, after sustaining trauma may suffer a traumatic inflammation which results in sharply localized pain when weight is put on the ball of the foot or when the great toe is moved. This pain is caused by the flexor tendons which are attached to the bones and their contraction or movement causes a rubbing of the inflamed surface. Trauma may not result in this inflammation, but the small bone may be split, with little separation of the fragments. Its fibrous investment or periosteum, which is the tendon fibre, becomes the subject of an irritative and proliferating reaction, an irritative periostitis. This is aggravated by weight-bearing pressure and movements of the metatarsophalangeal joint, as in walking, until a permanent thickening of the injured and irritated bone follows. Sympathetically and by continuity and on account of the increased pressure of this enlarged bone button, the flexor brevis hallucis tendon sheath may become the seat of a tendosynovitis which renders walking, especially if attempted in an ordinary tight shoe, very painful. Nothing can be found distinctly on examination. The injury is called a bruise and a little rest or hot application prescribed. After a short rest the tendosynovitis quickly subsides, the patient suffers less and thinks his troubles are at an end. He then starts off to use again and in a few days the pressure of the enlarged bone seed causes a recurrence of all symptoms. This may occur over and over many times and the distressed individual eventually makes up his mind that he has got to suffer this inconvenience.

Some of these cases of which pictures are shown have been cared for by competent practitioners; one, a trained nurse, tried every means of relief. She was fitted with a metal arch support by an orthopædic surgeon; this failing to give relief, she was treated as a rheumatic by another practitioner. Many different diagnoses of this condition from arthritis deformans to metatarsalgia have been made and failed to offer relief.

A glance at the lateral views of the fracture cases demonstrates the mechanism of the pain and disability caused as outlined above. A prolonged rest from weight-bearing in a shoe will give relief but the condition is apt to return. A shoe so constructed that a special pad fits beneath and around the great toe to take the body pressure off this exact point is also helpful. When the skiagram gives undisputed evidence of fracture in the anteroposterior view, or the lateral view shows the thickening of the bone, the best and lasting treatment is removal by open operation.

In removing these I make a lateral incision well above the heavy plantar skin, about 2 inches in length, along the outer surface of the great toe joint. The plantar flap is reflected downward and dissection made inward, keeping just proximal to the line of the joint. By careful palpation through the plantar skin the bones can be located. They should be dissected out, both from the fibrous covering of the tendon, without opening the joint structures. Both should be removed, for if one is left without its companion support it would soon become the source of irritation on account of its localized pressure. Deep tissues are closed by catgut and skin by horse hair or clips. As soon as stitches are removed, the patient in bearing weight will find that no pain results. After twelve to fourteen days ordinary occupation can be resumed.

Of the five cases given here 4 are of the internal sesamoid. This I believe can be explained by the fact that the external bone lies a little lateral to the head of the metatarsal bone and is not directly subject to the pressure trauma or sudden increase in weight-bearing force. The case given in which the external or lateral bone was broken was due to direct violence in the nature of a heavy box falling on the toe. The distal phalanx was badly damaged, as shown in the skiagram.

THE FREE TRANSPLANTATION OF FASCIA LATA

IN THE REPAIR OF VENTRAL AND INGUINAL HERNIÆ WITH CASES*

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The free transplantation of tissue from one part of the body to another part of the body for service is an accomplished fact and for some kinds of tissue it is so uniformly successful that a new chapter is being written into the surgery of our time. The success of the transplant does not depend so much on the complexity or the simplicity of the tissues which are transferred to new situations as it does on their blood supply. Tissues with an abundant blood supply are the most difficult to transplant with success, while tissues which are meagerly supplied with blood-vessels may be transplanted with the greatest assurance of success. Their demand for nourishment in their new home is more easily met by the lymph which oozes about them and into them, until new vessels and new connective tissue can grow to them and make them an integral part of the tissues in their new situation.

Fascia is such a tissue. It can be transplanted with almost uniform success. It is easier to transplant than bone and it is much more sure than the ordinary skin graft. In animals, I have transplanted fascia or tendons some forty-four times and have lost the transplant in only one animal, and that was due to an accidental sepsis.

It is not my purpose to report this series of experiments here. This paper is written to urge the use of transplanted fascia in the routine of practical surgical work, to add strength and to supply defects in ventral and inguinal herniæ. Plastic flaps in these cases can do much, but often they can be greatly strengthened or can be replaced by a strong fascial transplant such as may easily be taken from the iliotibial band of the fascia lata.

The following case illustrates its successful use in a large ventral hernia:

> A woman of forty-eight came into the City Hospital on the University Service, with a strangulated hernia the size of a small grape fruit, in the

* Read March 26, 1914, before the Missouri Valley Medical Society, Lincoln, Nebraska.

scar of an old abdominal incision. The strangulation had been present only a few hours and was reduced under gentle taxis without much difficulty. The symptoms subsided rapidly and she was watched carefully during the succeeding hours. As nothing developed she was allowed to remain in bed a few days to gain her physiological balance before an attempt to close the hernia was made. During the previous four years she had been operated upon three times, twice for abdominal lesions she did not understand and the third time for an unsuccessful closure of the rupture. Her scar reached from an inch and a half below the typhoid cartilage to about two inches above the symphysis, and the umbilicus had been removed. The inverted skin allowed a fist to be thrust through the hernial opening and the tissue was thin just above and below this opening.

At operation the main opening was found in the median line about four and a half inches long and three and a half inches wide with two small secondary herniæ, one above and one below the main one (Fig. 1). These two smaller ruptures were easily closed by the method which has been found the most satisfactory in cases of umbilical herniæ—that is, by an upper and a lower flap so managed that one flap of tough fibrous tissue is drawn under the other by mattress sutures and the other is made to overlap it like an apron, with a suture line along its margin.

When it came to the larger hernia, it was easily to be seen that it would be impossible to close the opening between the recti muscles by direct suture. The opening was so wide and the tension would be so great that any sutures would soon cut through. A plastic operation was at once undertaken. The rectus sheaths were intact and the anterior layer ran smoothly around the muscle edge to join the posterior layer. This fact was utilized to turn a flap across the wide opening the full length of the hernia and to suture it along the edge of the rectus of the opposite side. This flap was cut the entire width of the rectus sheath and at one place included a portion of the external oblique also. A return flap was cut in the other rectus sheath and turned across and sutured into place, making a double thickness of rectus sheath to stop the opening. At the time this was thought to be sufficient. The skin was sutured and the patient returned to bed.

After the union had gone on to a good healing and we were about to let the patient go home, the hernial site still seemed a little thin to me and she accepted my proposal to strengthen it still further by a transplantation from the fascia lata. After dissecting back the skin and superficial fascia, the repair seemed much firmer than it had when examined from the outside but a strong transplant would certainly improve it. A seven-inch incision was made in the outer aspect of the thigh and two strips of the strong iliotibial band were taken, beginning just below the insertion of the vagina tensor femoris, where the fascia is strongest, three inches long and a little over two inches wide, one below the other. These were sutured side by side, transversely across the previous repair with the idea that the lines of force would act in the direction of their fibres by the natural pull of abdominal muscles under use when they had finally healed into place (Fig. 2). For we have found as the result of numerous experiments on animals, as others have found, that unless transplanted fascia

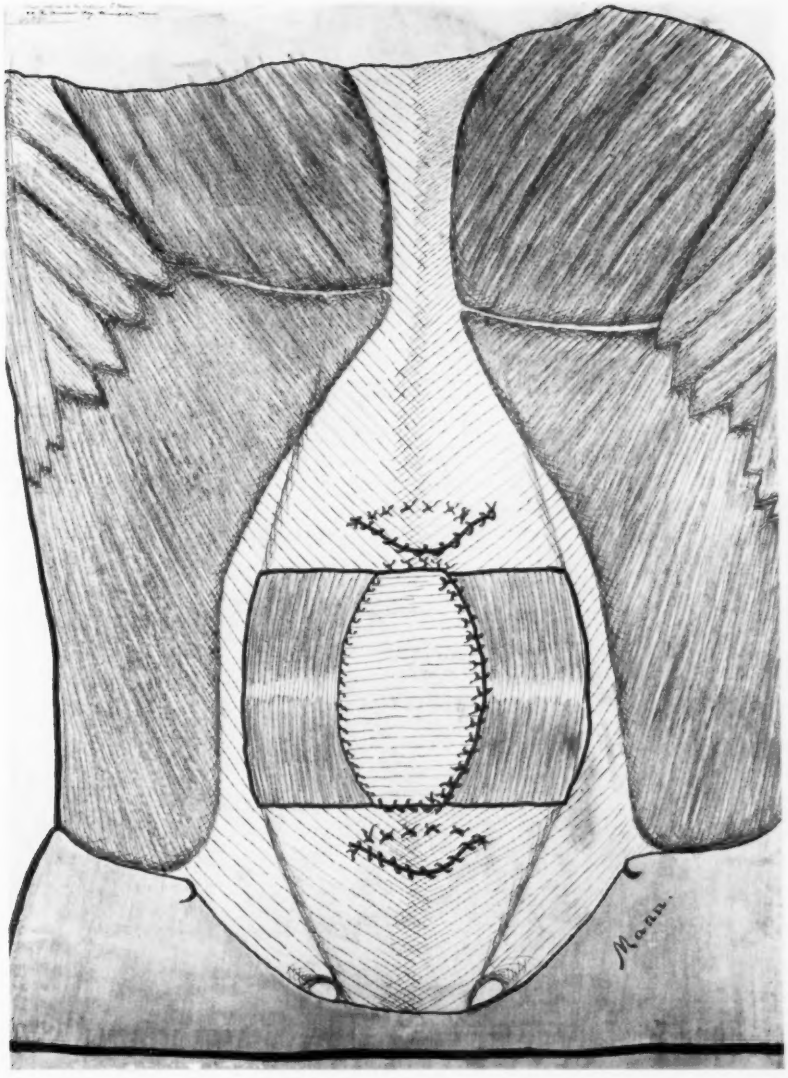

FIG. 1.—Repair of large ventral hernia by turning over first the flap of the external sheath of one rectus and then that of the other across the opening. The two small ones each repaired by drawing one flap of strong fibrous tissue up under the other, which was brought down over it like an apron, with a suture along its edge as in the usual peri-umbilical hernia.

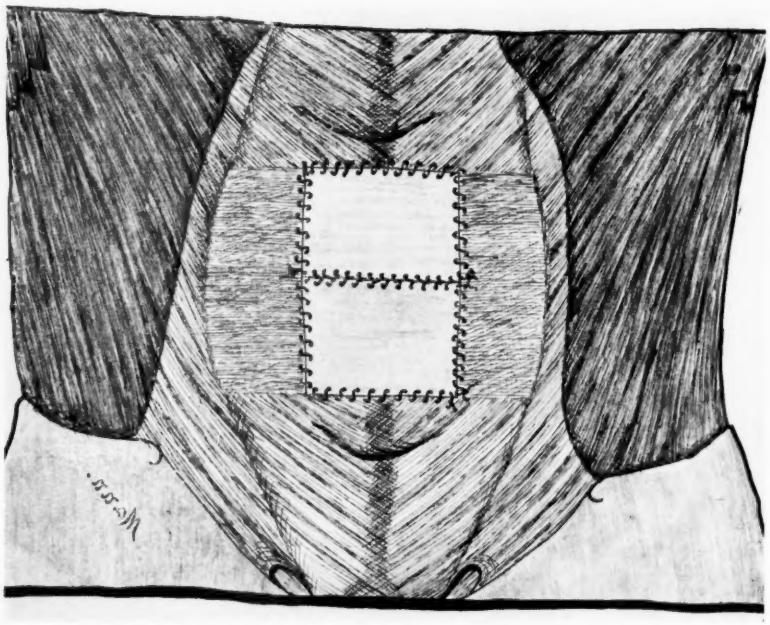

FIG. 2.—The two free transplants of the iliotibial band of the fascia lata sutured transversely across the repair shown in Fig. 1.

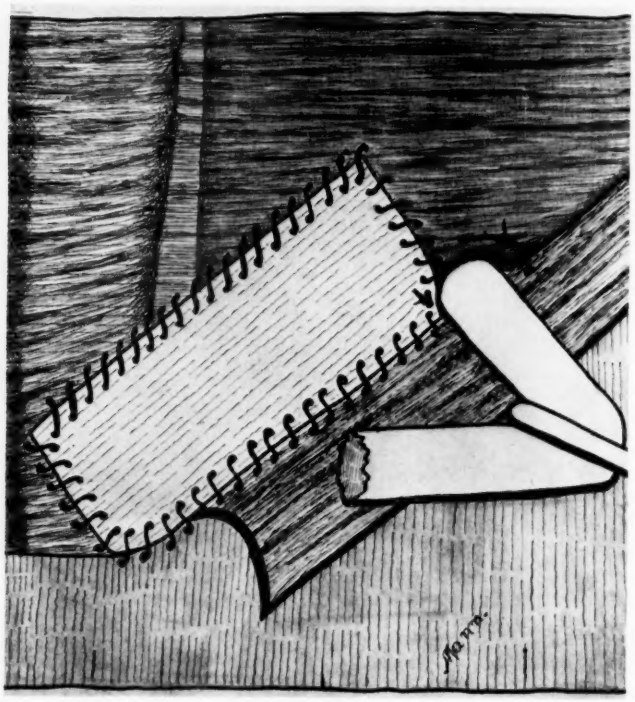

FIG. 3.—Free transplant of iliotibial band of fascia lata inserted above the first line of sutures in a modified Bassini operation for the repair of an inguinal hernia with weak tissues. This is sutured snugly across the lower margin of the internal ring, then along Poupart's ligament and well on to the sheath of the rectus and lies over the rectus sheath, the conjoined tendon and the internal oblique. The upper flap of the external oblique and the lower portion of the cord are omitted from the drawing for the sake of clearness.

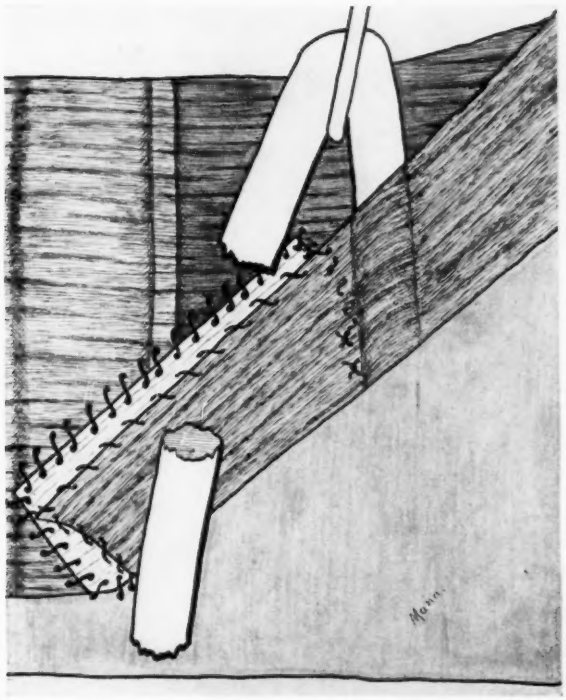

FIG. 4.—Shows the lower flap of the external oblique sutured beneath the cord to add one more layer for the strength of the repair. It is drawn well over on to the rectus sheath to protect the second commonest point of recurrence opposite the external ring and sutured carefully across the lower margin of the internal ring to protect this place again, which is the greatest place of recurrence.

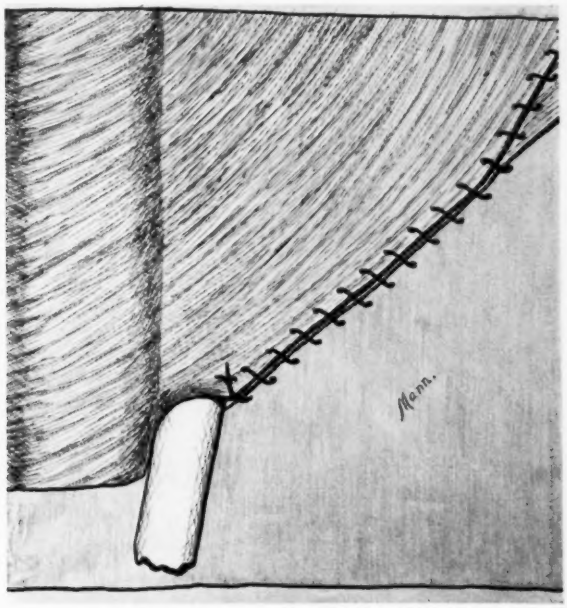

FIG. 5.—Shows the upper flap of the external oblique sutured over the cord to Poupart's ligament to make a new canal for the cord.

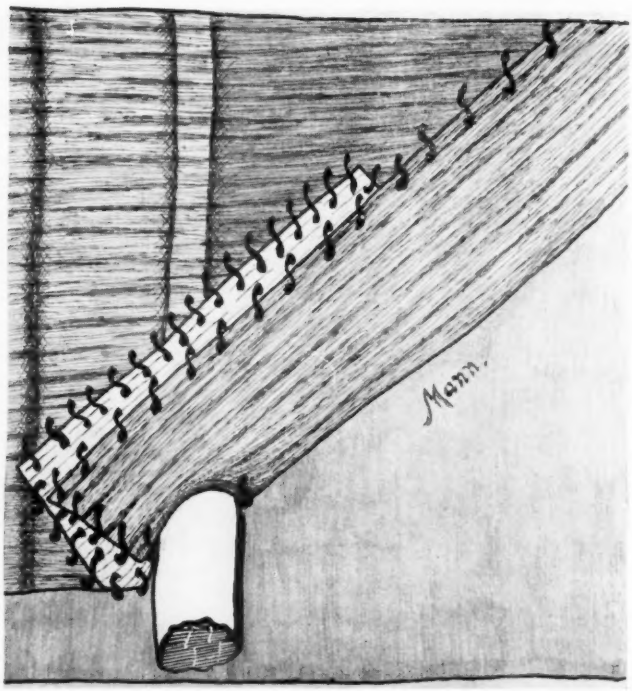

FIG. 6.—Shows the fascial transplant adapted to the Ferguson operation. It is inserted over the internal oblique and the conjoined tendon and well on to the rectus sheath, beneath the lower flap of the external oblique. Great care is taken to suture both of them about the emerging cord. This is also true of the upper flap of the external oblique, which is not here shown, but which is sutured as in Fig. 5.

or transplanted tendons are kept on the stretch they shorten and become more or less replaced by ordinary connective tissue, but that when they are so fastened they preserve their structure and can sustain the strong pulls for which they are made. These transplants healed firmly into place and gave us a strong closure of our abdominal wall. The wound in the thigh healed by first intention with no loss of function in the leg and without any bulging of the muscles at rest or in use.

The use of fascial transplants in the repair of inguinal herniæ with thin or defective tissues is a little more complicated because it must fit in with the technic of the operation, but these transplants heal into place readily and firmly. I feel that the method is of distinct advantage in gaining strong closures in some of our most difficult cases.

The following case illustrates the method I have used in adapting the transplant to the Bassini operation. A male patient, on the University Service of the City Hospital, had both a right inguinal and a right femoral hernia. Both ruptures were repaired through the same incision, the femoral hernia by suture of the pectineal fascia to the lower surface of Poupart's ligament in the usual way; in the inguinal hernia the arcuate fibres of the external ring were cut well toward the top of the ring and the aponeurosis of the external oblique was separated from this point in the direction of its fibres well out beyond the level of the internal ring, making a lower flap a little less than an inch in width. The sac was dissected, opened and ligated, and the cord raised in the usual way. The conjoined tendon and the internal oblique and transversalis muscles which run into it were all thin and gave promise of a poor result. The transversalis fascia and the cremaster were both thin and did not offer much additional support. The thin outer edge of the internal ring was gently rooted outward with the finger, until the first thin fibres gave way and the thick mass of muscle fibres arching across from Poupart's ligament just above it gave a firm upper edge for the new ring. A supporting stitch, as suggested by Coley, was inserted in this muscle just above the ring to draw it to Poupart's and another close below the cord to make a snug ring, after the cremaster had been drawn upward beneath the muscles and the conjoined tendon by mattress sutures after the method of Halsted.

The muscles and conjoined tendon were carefully sutured to Poupart's, as in the Bassini operation, but they were fastened to the lower part of the shelving portion of the ligament and the sutures were passed through the ligament so that the knots would lie on the outer aspect toward the thigh and not interfere in any way with the healing of the fascial transplant which was now removed, an inch and a quarter wide, from the iliotibial band in the outer aspect of the thigh and sutured (Fig. 3) along its lower border to the upper surface of the shelving portion of Poupart's ligament, with its outer end snugly up against the internal ring and its inner end reaching well on to the surface of the rectus sheath to near the midline of the body. The outer end was sutured snugly across the lower margin of the internal ring and upward to its top corner to

add material strength to the ring. The top border was sutured to the surface of the internal oblique and inward on to the rectus sheath and the inner end smoothly to the rectus sheath. In this way the two points of greatest recurrence, the one at the internal ring and the other opposite the external ring, were greatly strengthened as well as the entire suture line between.

The cord was now held upward and the lower flap of the external oblique aponeurosis (Fig. 4) was sutured snugly across the lower margin of the internal ring and upward to its top border, again strengthening this ring. The inner end of this flap, which was originally the margin of the external ring, was drawn inward well on to the rectus sheath and sutured smoothly into place, in this way strengthening the inner point of greatest recurrence as well as the entire suture line by an additional layer of strong tissue. The upper border of this flap was now sutured to the parts below, completing the suture of all the tissues which were to lie below the cord. The cord was now dropped into place and the lower edge of the upper flap of the aponeurosis of the external oblique, which had been somewhat loosened from the internal oblique, was now brought down over the cord and sutured to Poupart's to form a canal for the cord (Fig. 5). The inner end of the suture line was stopped at a point which would leave an easy opening for an external ring and the operation was completed by suture of the skin incision.

This patient healed by first intention throughout and when he was in condition to be up and about, the site of the inguinal repair felt firm, the tissues seemed thicker and more resistant than after the usual Bassini operation.

I have operated on two other inguinal herniæ by this method in a patient who had a double rupture, one of which, at least, he had carried for over forty years. In his case the conjoined tendons and the muscles near them were so thin that there were spaces in them which were practically holes.

In adapting the transplant to the Ferguson operation for the radical cure of an inguinal hernia where the cord is dropped back and the internal oblique and transversalis muscles, together with the conjoined tendon, are sutured to Poupart's over the cord, the technic is more simple. The fascial transplant in this case can be sutured over the first layer of tissues, taking care to suture the inner end carefully about the emerging cord, and then over on to the sheath of the rectus (Figs. 5 and 6).

In conclusion I simply wish to say that the fact that transplanted fascia held on the stretch heals into place and preserves its structure and its strength in its new situation, has been abundantly proven, as well as the fact that we may probably count on a living transplant in every case of ordinary surgical first intention.

A CRITICAL ANALYSIS OF THE TREATMENT OF FRACTURE OF THE NECK OF THE FEMUR*

By Royal Whitman, M.D.
of New York

It is now nearly twenty-four years since I became interested in fracture of the neck of the femur through the identification of the then unrecognized cases in early life.

As these fractures were usually incomplete, the immediate results were most satisfactory. Further observation showed, however, that the deformity, since known as traumatic Coxa Vara, always entailed disability. This demonstration of the dependence of function upon form and of the futility of conventional treatment, eventually suggested the abduction method, by which natural leverage, ligamentous tension, and muscular relaxation are utilized to correct deformity and to appose the fragments. The opportunity for functional recovery thus assured is supplemented by adequate support, and by protection during the prolonged period of repair.

The new method has had the great advantage that technical efficiency was the only consideration in the class of patients to whom it was originally applied, and that from this standpoint it has been adapted to cases of the ordinary type. Thus, by a process of natural evolution the application of surgical principles has been made practicable as a basic routine of treatment.

In every particular the abduction treatment is at odds with accepted principles and practice. It is taught, for example, that technical efficiency is usually impracticable because of the condition of the patient; or impossible because of the situation and character of the injury; or useless, because deficiency of circulation or spontaneous absorption or the presence of synovial fluid will prevent repair; and it is a surgical axiom that the deformity of the so-called impaction shall not be disturbed.

The consequences of a disabling injury are, economically at least, far more important to the young and vigorous than to the feeble and the aged. Yet the latter class has always received the first consideration and has determined the treatment for all. The chief concern is that it shall do harm, either by prolonged restraint or by disturbing the contact assured by so-called impaction. It is applied temporarily to

Read before the New York Surgical Society, March 11, 1914.

relieve pain or to protect deformity, and for longer periods to appose and fix the separated fragments. The essential basis of the methods employed is traction in the line of the body. This is so inadequate for its purpose that it could be made effective, if at all, only by careful adjustment and constant supervision. Under ordinary circumstances, therefore, the attainment of its object is usually a matter of chance.

The results correspond to the character of the treatment. According to the latest statistics, those of the British Committee, in but 22 per cent. of the cases could they be classed as good, even from the weight-bearing standard.

Dismissing for the sake of argument, preconception and prejudice, it will be admitted, that in a large proportion of the cases, some treatment is applied with the design of promoting the repair of the local injury, however remote the prospect may be.

It has been amply demonstrated in recent years that repair is possible in every variety of this fracture. On the other hand, it is evident that union is impossible unless the fragments are in contact, however adequate the blood supply and however great the resistance to spontaneous absorption. The object of treatment, therefore, is to provide the opportunity for repair, since otherwise failure is inevitable.

The abduction treatment is the only method that enforces this principle and the only method by which the principle can be made effective in a comprehensive sense. It was presented to this society in 1902, but it still remains a novelty, in all but name at least, if the misconceptions of the text-books may be accepted as a criterion.

For this reason a description of the method is an almost essential preliminary to intelligent discussion, which must of necessity involve the foundations of accepted teaching.

This description may begin with the complete fracture, since this is the only form in which direct comparison with other methods is possible.

The patient, usually anæsthetized, is lifted to a pelvic support, preferably furnished with a perineal bar for counter pressure, the extended limbs being supported by assistants. The assistant holding the uninjured limb abducts it to the normal limit in order that it may serve as a guide, and incidentally to fix the pelvis. The injured limb is first flexed and rotated sufficiently to disengage soft parts that may be interposed between the fragments. It is then completely extended, and the assistant, by direct manual traction, overcomes the shortening, as demonstrated by measurement and by the relation of the trochanter to Nélaton's line, at the same time correcting the outward rotation. Still maintaining steady traction, he then abducts the limb to correspond with

its fellow, the operator meanwhile supporting the joint and lifting the thigh upward. The pelvis should now be level and the extended limbs in exact correspondence in every particular. A plaster spica is then applied from the axilla to the toes. This should be carefully adjusted about the pelvis and trochanter. It should completely cover the buttock and be heavily reinforced beneath the joint and thigh, that it may be unyielding to pressure and therefore effective as a posterior splint to hold the limb at its proper plane.

The complete reduction of the shortening is the basis of the method, and it is therefore essential to its success. The reason for correcting or even slightly over-correcting the outward rotation is self evident. The limb is lifted because it is often below its proper relation to the trunk.[1] The reason for complete abduction is that in this attitude the surface of the outer fragment is turned to meet that of the inner fragment, and as the capsule becomes tense, it directs them toward one another and finally forces them into contact. The tense capsule is in itself an antero-posterior splint, while upward displacement is prevented by the engagement of the outer fragment beneath the acetabular rim, if the fracture is near the head, or by direct contact of the trochanter with the side of the pelvis, if it be at the base.

The attitude of abduction prevents also displacement by muscular action since the pelvi-trochanteric group is relaxed, while contraction of the iliopsoas and adductor muscles would tend to appose, rather than to separate the fragments.

It may be noted that the plaster spica is a supplemental rather than a direct splint, its purpose being to assure the attitude rather than to fix the fragments by direct pressure. If, therefore, it holds the limb in complete abduction and complete extension and if it is unyielding beneath the joint, there is no danger of displacement even if atrophy loosens the support. If the spica is properly adjusted about the pelvis, it is quite unnecessary to include the other thigh, although this may be indicated if the less effective short spica is employed.

Incomplete Fractures.—The deformity in nearly all the incomplete fractures may be easily corrected in the manner described, aided by gentle downward pressure on the trochanter. There is a type of incomplete fracture, however, in which the neck is depressed by the opening of a wedge-shaped interval in its upper border and in which the de-

[1] If the fracture is complete there is a strong tendency for the femur which lies on a higher plane than the trunk to sink backward. This is perhaps the chief reason for failure when conventional treatment is employed. The Maxwell method of anterolateral traction serves indirectly as a splint to prevent this and it is therefore the most efficient of all the traction methods.

formity is somewhat resistant. In such case correction is accomplished by traction and abduction, utilizing what has been called natural leverage to overcome the resistance. The explanation is as follows:

The range of normal abduction is checked by contact of the upper border of the neck of the femur with the rim of the acetabulum when in its descent it has reached an approximately horizontal plane. If, therefore, it is depressed to a right angle (Coxa Vara) contact is established and abduction is checked while the limb is in the line of the body. This contact fixes the neck and one may restore the normal angle by placing the shaft in proper relation to a horizontal neck, namely, in full abduction, thus bringing the fractured surfaces into contact. The limb is then fixed by the spica in the manner already described.

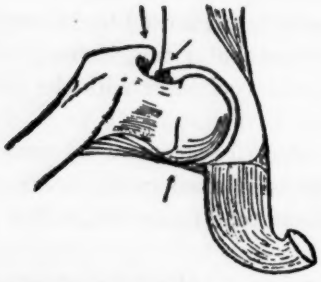

FIG. 1.—The range of normal abduction depends upon the angle of the neck of the femur. It is limited by tension on the capsule, by contact of the upper border of the neck with the acetabulum and of the trochanter with the side of the pelvis.

FIG. 2.—The characteristic displacement of complete fracture is of the femoral fragment laterally and backward by the influence of gravity and upward by muscular tension.

Deformity, however slight, should be corrected as the essential preliminary of restored function, and far from endangering repair, it is the best means of hastening it by apposing the cancellous surfaces upon which the union in fracture of the small part of the neck depends.

As the abduction method is based on the anatomical construction of the joint, its typical application implies the restoration of an approximately normal contour, as is possible in the great majority of fractures caused by indirect violence. If, however, the bone were crushed or telescoped, or if the neck were otherwise shortened, thus limiting abduction, the method, like any other definite surgical procedure, must be modified in adaptation to the changed conditions.

In a treatment designed to restore function, as distinct from the capacity to support weight, the protection of the weakened part during

the period of repair and reconstruction is almost as important as the preliminary reduction of deformity. No direct pressure should be permitted for many months nor until voluntary control has been regained and until passive movements are relatively free and painless. This calls attention to another advantage of the treatment, since the fixation of the limb in abduction assures freedom of movement in that direction, in place of the restriction that is invariably present even in the most successful cases treated in the ordinary manner.

Under the present system early weight bearing is not only permitted but encouraged on the ground that repair will either be hastened or that the patient will the sooner become accustomed to a disability that is regarded as, in most instances, inevitable.

The most constant misconception of the abduction treatment is that its application requires force or even violence and that it is a dangerous treatment as compared with conventional methods which are supposed to be peculiarly adapted to physical weakness.

Normal abduction is often described as forced abduction, when, practically speaking, no force whatever is required except in the reduction of epiphyseal displacements, a type not now under consideration.

The plaster spica also, which in the absence of especially constructed apparatus is the only splint at command, is thought to be a relatively uncomfortable and dangerous form of restraint. Consequently some of those who appreciate the technical superiority of the method would restrict it to the treatment of youthful subjects.

On the contrary, as compared to other methods, the abduction treatment is not only efficient in the technical sense, but it has a far wider range of application. The plaster spica being an independent splint and free from attachments, permits any desired change of posture. And the head of the bed may be elevated to any degree to lessen the danger of internal congestion and to increase the blood supply of the injured bone.

Thus, pain on movement, the most dangerous and depressing form of restraint; bedsores, the most constant accompaniment of enforced rest upon the back; and hypostatic congestion, still further favored by elevation of the foot of the bed, as is usual when traction is employed, are practically eliminated as complications.

I do not propose to befog the issue of efficient technical treatment by considering cases of what may be termed the inoperable class. It may be of interest to note, however, that an interval of eighty-five years separates the youngest from the oldest patient to whom this treatment has been successfully applied.

I trust that this exposition has justified the statement that the essen-

tial distinction of the abduction method is that obstacles have been transformed to aids in that it utilizes the construction of the joint to apply surgical principles.

It is therefore the only safe and practicable means of correcting deformity of the incomplete or so-called impacted type. It is far more efficient in assuring coaptation of separated fragments than any other method, even if applied under the most favorable conditions, since, assuming that the primary adjustment is satisfactory, its maintenance is dependent upon the quality of the nursing. Finally, adequate protection during the period of reconstruction is enforced as an integral part of the treatment.

However efficient the method, it is evident that skill, and experience in the selection of cases, and in modifying and adapting it to the con-

FIG. 3.—Illustrating adjustment of the fragments by abduction. Security is assured by ligamentous tension and direct contact and by the elimination of the deforming influence of muscular contraction.

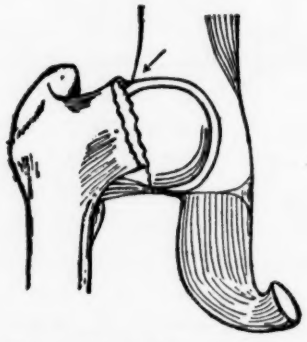

FIG. 4.—A type of so-called impaction in which the femoral fragment is displaced upward and outward, thus checking abduction. This deformity may be easily corrected by the abduction method without the slightest danger.

dition of the patient and to the character of the injury, are requisite for the best results. Furthermore, as a firm and comfortable splint to supplement the correction of deformity is even more essential in the treatment of this than of other fractures, a certain familiarity with plaster technic is desirable.

The abduction treatment demands, therefore, more initial energy and a higher standard of technical skill than are usually at the command of this neglected injury. On the other hand, since a new treatment must of necessity be applied by novices, it has the great advantage that its purpose is clear and definite; that its effects are capable of demonstration and that from the beginning to the end it is controlled by the one who is responsible for the result.

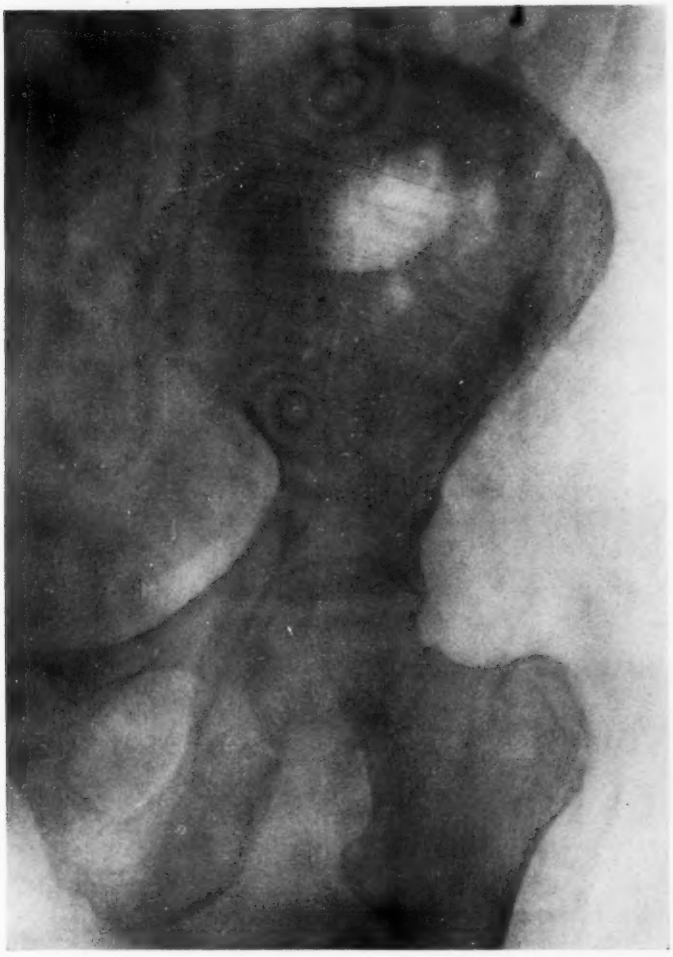

FIG. 6.—Illustrating an anatomical cure of a complete intracapsular fracture in a woman 65 years of age treated by the abduction method. The projection on the upper border of the neck indicates the line of fracture.

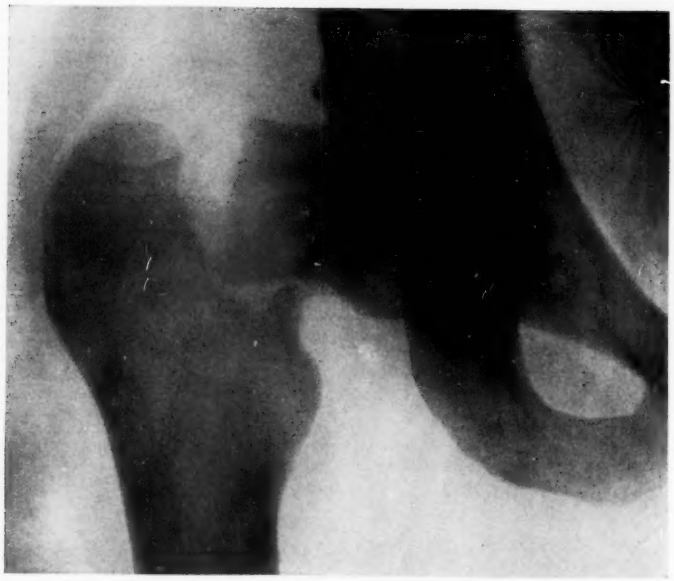

FIG. 7.—A series of pictures illustrating slow repair in fracture of the small part of the neck. The patient, a man thirty-one years of age, fractured the hip while playing tennis. He continued to walk about with canes for nearly six weeks.

FIG. 8.—Taken through the plaster after reduction of the deformity.

FIG. 9.—Six months later, showing slow repair. The separation of the fragments indicates that the degree of abduction at the time of the operation was not sufficient to force contact, or that the union was not strong enough at the end of three months, when the spica was removed, to prevent a slight recurrence. (Reversed.)

FIG. 10.—Two years after the accident, showing almost complete repair. As compared with Fig. 9, the lessened angle may be noted, although the injured bone was protected by the use of a hip splint for more than a year. These pictures demonstrate several important points. 1. That the neck of the femur in a vigorous person may be broken by what appears to be slight violence. 2. That a fracture may not cause complete disability. 3. That in this instance the deformity could not have been reduced by conventional treatment, and that efficient protection was essential to success.

FIG. 11.—The elevation of the head of the bed (25°) to provide a semi-reclining posture and thus to lessen the danger of thoracic congestion and to improve the nutrition of the injured part.

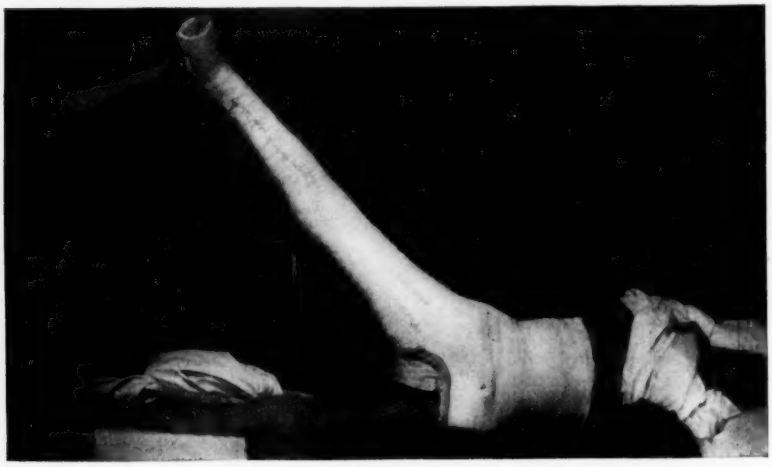

FIG. 12.—The plaster spica holding the limb at the limit of normal abduction, illustrating the adjustment to the pelvis and to the hip.

The question of prognosis, particularly as it is influenced by treatment, is necessarily limited to the class of cases in which treatment is applied, the class for example that has furnished the statistics already referred to.

The causes of failure as presented in the text-books are:

1. Low vitality and thus incapacity for repair.
2. Crushing of the bone by direct violence.
3. The impossibility of assuring apposition and fixation of the fragments.
4. Spontaneous absorption.
5. The presence of synovial fluid.

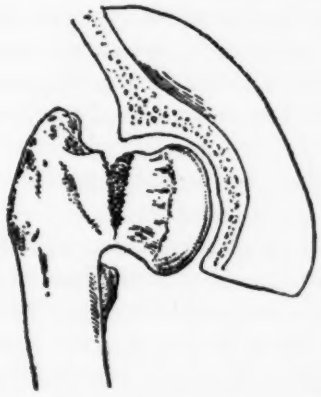

FIG. 5.—Another type of incomplete fracture which may be corrected by natural leverage.

Of these the first is the most important, and the most reasonable. But if the fracture is to be treated at all, it is also the most forcible argument for accurate and secure adjustment of the fractured surfaces in order to assure, at least the possibility of union. Assuming that the capacity of repair is normal in childhood and that it diminishes with advancing years, the results should correspond fairly with the age of the patient.

This is not apparent in the statistics that have been quoted. Twenty of the patients were between twenty-four and forty-five years of age with six good results. Thirty were between forty-five and sixty, with eight good results, and thirty-six were more than sixty, with five good results. I may add a personal observation of five cases of non-union in early life, in patients treated by conventional methods.

Crushing of the bone by extreme violence must be unusual and as this would prevent success in the treatment of any fracture, it needs no further consideration.

That the apposition of separated fragments by the means hitherto available is doubtful and that this is a valid reason for not correcting deformity, needs no discussion, since it is the purpose of this paper to prove it.

Absorption in other situations is considered a consequence of nonunion, of atrophy and friction of the fragments. Such natural absorption should be relatively rapid at the hip because of the small proportion of resistant bone in the femoral neck.

"Spontaneous" absorption, it may be assumed, is a mysterious process that must prevent repair under any conditions. Neither natural nor spontaneous absorption occurs in cases successfully treated and the best prevention must be, therefore, efficient treatment.

The same reasoning applies to the synovial fluid which is present in all joint fractures and whose influence on repair is problematical.

The prognosis based on anticipated failure is the most scientific and the most helpful element of conventional teaching. It is scientific because it is supported by actual results, whatever the interpretation put upon them. It is helpful because the exponent of efficiency has much to gain and nothing to lose by comparison.

It would seem that the methods hitherto at command have been technically inadequate; that this inadequacy has established the principles of treatment; that defective principles and inadequate methods have led to carelessness and neglect, and that the combination accounts for the results. The results in turn have been accepted as evidence of the incapacity of the tissues for repair, thus completing the vicious circle that explains the general lack of interest in the most disabling of all fractures.

The aim in treatment should be anatomical and functional cure, since this offers the only possibility of complete success and the best assurance against complete failure.

However radical this proposition may seem, it is the principle on which every other fracture is treated, a principle to which the abduction treatment conforms and by which alone, in a comprehensive sense, it may be applied. It would seem, therefore that it must eventually displace methods that have been so thoroughly discredited by practical experience and as a natural consequence the superstructure of traditional teaching that excuses the quality of treatment that these unfortunate patients receive.

FLASHLIGHT AUTOCHROM PHOTOGRAPHY OF PATHOLOGICAL SUBJECTS

By Harry H. Hart

of Baltimore, Md.

Röntgenologist and Pathological Photographer to the Howard A. Kelly Hospital

The use of autochroms in the study of diseases is not new. Monsieur F. Monpillard, in a paper read before the French Photographic Society and published in the *British Journal of Photography* of May, 1911, gives Dr. Morax, of the Lariboisière Hospital, credit for first establishing a regular installation for autochrom photography of pathological subjects by flashlight. Such an installation may be added at small expense to the equipment of almost any hospital, and its advantages are obvious.

The speed of the flashlight (about one twenty-fifth of a second) makes it possible to secure pictures of children and nervous patients, who could not keep still long enough to be photographed by the slow daylight method. By making the autochroms lantern-slide size, we obtain permanent and absolutely true records of lesions with characteristic coloring, and in a form which enables us to demonstrate them to students at any future time. In our collection we have pictures of epitheliomata of the eye, nose, mouth, ear, chin and cheek; sarcomata of the forehead, parotid (melanotic), and shoulder; and several varieties of breast cancer. Lesions of the skin with pale delicate colors are not so successful, as the grain of the plate interferes somewhat with the definition. The autochroms give satisfactory results when projected in a stereopticon, provided the image is not magnified too many diameters, and a fairly strong arc light is used in conjunction with a perfectly white opaque screen.

Many hospitals are now provided with some facilities for making photographic records of cases, and anyone with a working knowledge of photography can soon learn the few additional points necessary to make autochroms. The Lumière Company distributes free of charge a little instruction book embodying all the essential features of the process. We have recently adopted a special cabinet for the ignition of the flash powder which possesses a number of advantages over the open flash lamp heretofore used for autochroms (Fig. 1). These advantages consist in:

1. Safety. The interior of the cabinet is lined with sheet asbestos (painted dead white), and the diffusing screen covering the front is fire-proof. This overcomes the greatest objection to the use of flashlights in hospitals, where a fire among patients unable to look after their own safety is apt to have very serious consequences.

2. The large reflecting surfaces add enormously to the power of the illumination, so that we can secure full exposures by the use of half the quantity of powder recommended by the Lumière Company for the open flashlight lamp.

3. The diffusing screen serves to spread the light and to give finer detail and roundness to the image.

The general plans for this cabinet were kindly furnished by Mr. Otto Doehn, of the Eastman Kodak Company, who has used a similar one for flashlights on ordinary photographic plates. We found it necessary to make several changes in his original designs, in order safely and efficiently to handle the heavy charge of powder necessary to secure sufficient exposure of autochroms, which are much slower than the average plates.

The cabinet proper consists of a box built of light, half-inch boards, reinforced at the joints by heavy strips of wood. It is suspended by cables and pulleys to an upright frame, nine feet high and four feet two inches wide, and is thus easily adjusted to any desired height (all dimensions given are outside measurements). The ground supports at right angles to the upright frame are three and a half feet in length and are provided with castors, so that the whole apparatus can be moved about. The box is five feet high, by three feet eleven inches wide, and at the top measures thirty-two inches from front to back, and at the bottom twenty inches from front to back. The back is perpendicular to the bottom, and the front slopes up to an obtuse angle of about 100° to the base. The box is provided with a door in front, hinged at the top and fastened by hooks at either side. This door is a frame made of strips of wood two and seven-eighth inches wide, and seven-eighths of an inch thick. Attached to each corner of the frame by short pieces of broad elastic is the diffusing screen; this consists of fire-proof[1] Persian lawn, bound on all four sides with strong white tape (*A, B, C, D,* Fig. 1). The object in fastening the diffusing screen only at the corners by means of elastic, is to allow an outlet for the gas suddenly generated by the ignition of the powder, which would split the screen if it were fastened tightly to

[1] See the Lumière Autochrom booklet for fire-proofing formula.

FIG. 1.—Front view of flashlight cabinet. *A*, *B*, *C*, *D*, short pieces of elastic used to fasten the light-diffusing screen to its frame; *E*, 500 candle power tungsten lamp for focussing.

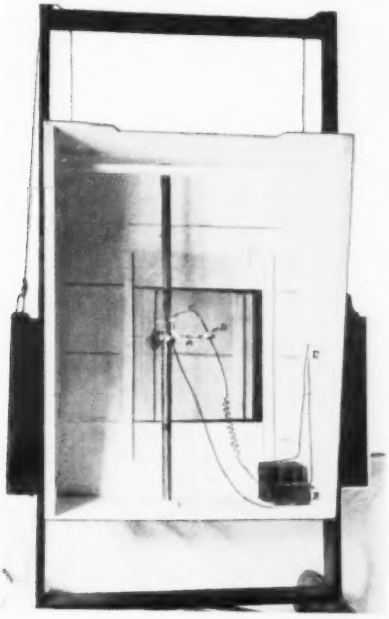

FIG. 2.—Interior of cabinet, front door removed. *A*, powder shelf; *B*, spark coil; *C*, brass strip forming upper electrical terminal; *D*, spark gap; *E*, wires running through walls of cabinet to outside switch.

the frame. An outlet for the smoke is provided by cutting an opening in the roof of the box just behind the front door. A smoke-bag of fire-proof muslin can be arranged to fit over this opening. This bag is closed by a draw-string after the flash is over, and the smoke carried out of the building and emptied. A smaller door (two feet square) at the back of the cabinet gives access to the shelf which holds the powder.

Fig. 2 shows the interior of the cabinet, the front door having been removed. The powder is spread upon the shelf *A*, which is made of asbestos board, seven inches long and three inches broad. Ignition is secured by means of a spark from a small induction coil *B*, which is excited by the six-cell battery shown just behind the coil. One electrical terminal consists of a piece of brass in the floor of the asbestos

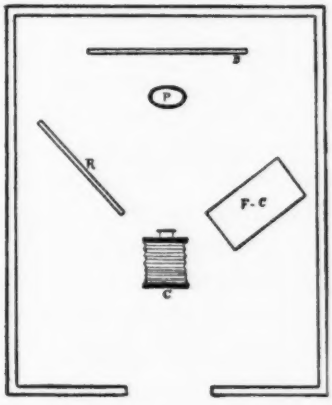

FIG. 3.—Diagram showing general arrangement of flashlight studio. *C*, camera; *P*, patient; *F. C.*, flashlight cabinet; *B*, background; *R*, reflector.

shelf and the other terminal is the brass strip *C*. These terminals should be cleaned with sand-paper after each explosion of powder. The powder does not ignite easily and it is best to pile most of it in the centre of the shelf, and lead only a small quantity in the form of a train up to the spark terminal *D*. The shelf can be raised or lowered, as it is attached by means of brass spring clips to its support, which consists of a metal curtain pole placed a little to the left of the median line of the cabinet. The powder is ignited by closing a switch outside the cabinet connected with the wires *E*, which lead from the battery and induction coil through the walls of the cabinet. This outside switch consists of a piston which closes the circuit when a bulb is pressed at the end of a long rubber tube; this enables the operator to set off the flash when he is several feet away

from the cabinet. The opposite end of the bulb could be connected with a rubber tube leading to the lens shutter, so that the lens would be opened simultaneously with the setting off of the flash. This, however, we have not found necessary; we simply remove the lens cap just before making the exposure. Focussing is done by the light of a 500 candle power tungsten bulb (*E*, Fig. 1) which is moved out of the way before the powder is ignited. Daylight is eliminated from the room, as far as possible, otherwise the rendering of colors will not be accurate. The cabinet and powder shelf are adjusted so that the light is about one foot higher than the patient's head and about six or seven feet away from him. A reflector, consisting of an ordinary muslin sheet about four feet wide and six feet high, is suspended from a T-shaped support and placed about three or four feet from the patient, on the side opposite the light. Fig. 3 shows the general arrangement of the apparatus. *F–C* is the flash cabinet, *P*, the patient, *R*, the reflector, *C*, the camera and *B*, the background (of colored felt).

We use in this work a Cooke lens working at F/5.6 and are able to secure a full exposure on a four by five plate with one hundred and fifty grains of perchlora powder. This is just half the quantity recommended by the Lumière Company when using an open flash lamp at the same lens aperture. Even less powder may be used in making autochrom lantern slides, provided a relatively small image is desired.

The whole cabinet, including spark coil and battery, can be built by any good carpenter for about thirty dollars.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY

Stated meeting, held at the New York Academy of Medicine, March 11, 1914

The President, Dr. Frederic Kammerer, in the Chair

DOUBLE PERFORATION OF THE DUODENUM

Dr. Charles L. Gibson presented a young man who came to the New York Hospital in February, 1913, with two acute perforated ulcers of the duodenum, through which the contents of the bowel were escaping. The ulcers were closed separately by simply infolding the tissues, and while this produced a certain amount of diminution in the calibre of the gut, it did not seem sufficient to require a gastro-enterostomy, and the wound was closed.

A year had now elapsed since the operation. The patient had remained entirely free from his old symptoms; he had gained eighteen pounds in weight, and showed no evidence of stenosis or stasis. Dr. Gibson said he had shown this patient shortly after the operation, and his object in presenting him again to-night was to emphasize his contention that in operations for perforated duodenal ulcers, a gastro-enterostomy was only indicated in those cases where there was a distinct narrowing of the bowel, and that such cases were comparatively rare.

Dr. Charles H. Peck said he was inclined to agree with Dr. Gibson that many of these patients would make a permanent recovery after a simple closure of the duodenal ulcers, without gastro-enterostomy. On the other hand, there were a certain number where the ulcer was located near the pylorus, with a good deal of induration, and where the infolding produced a very decided narrowing of the pylorus. Under those conditions it seemed wise to do a gastro-enterostomy. The speaker said that while he was not prepared to give any figures, he did not believe as firmly now as he did some years ago that these patients could be left without a gastro-enterostomy as a matter of routine, and he thought it safer to do a gastro-enterostomy if the condition of the patient was not too critical.

Dr. Frank S. Mathews recalled a case of duodenal ulcer which

perforated twice in one year. After the first perforation operation was confined to closing the perforation. After the second a gastro-enterostomy was added to closure. The speaker saw the patient later, when suffering from a subphrenic abscess.

Dr. William A. Downes said that for some time he had felt that a gastro-enterostomy should be added in practically every case of perforated duodenal ulcer where the patient was equal to the procedure.

In one of his very recent cases, however, where the patient was *in extremis,* he hurriedly sewed up the ulcer, feeling certain that the duodenum was being almost occluded, without doing a gastro-enterostomy, and the operation was followed by one of the best recoveries he had ever had.

The President, Dr. Kammerer, said we should not lose sight of the possibility of a narrowing of the lumen of the gut after infolding of a duodenal ulcer. Personally, in these cases, he was always inclined to add a gastro-enterostomy whenever possible.

Dr. Clarence A. McWilliams said that in some experiments on normal cats, where they had excised at least one-half the diameter of the duodenum and then closed the wound, it was found at autopsies made at various periods afterwards on the surviving cats that the lumen of the gut had been restored to practically its normal size. It had apparently been stretched by the *vis a fronte* to the necessary extent.

VON RECKLINGHAUSEN'S DISEASE

Dr. A. V. Moschcowitz presented a girl, twenty-one years old, who was admitted to the Mt. Sinai Hospital on February 12, 1914. Her family history was entirely negative, as far as heredity was concerned. Some years ago a small tumor, the nature of which she did not know, was removed from the right side of the neck. Ten years ago she noticed a tumor the size of a walnut on the postero-internal aspect of the left arm: this had gradually grown larger, particularly so during the past year. Its growth was accompanied by pain and weakness, involving the entire upper extremity.

Upon examination, numerous cutaneous nodules were found scattered over the entire body, varying in size from that of a millet-seed to that of an olive. In addition, there were many palpable subcutaneous growths, usually of a larger size than the superficial ones. The postero-internal aspect of the left arm was occupied by a mass, approximately the size of a cocoanut, which was composed of a large number of discrete tumors (Fig. 1). This mass was very painful and tender;

FIG. 1.—Von Recklinghausen's disease.

otherwise, sensation was not disturbed. Pigmented areas were scattered over the entire body, a particularly extensive one covering most of the left half of the thorax and the left arm. The patient's mentality was excellent, showing that in this instance the third symptom in the triad of this disease was lacking.

The operation, which was done on February 17, 1914, proved extremely difficult and tedious, lasting over two hours. The musculospiral nerve was recognized and was found to be enlarged to the size of the little finger, but it was not involved in the tumor mass. One other nerve, the circumflex, led into the tumor, but the greater portion of it was preserved. The dissection led down to the humerus, and anteriorly up into the axilla. No claim for radicality was made, because at the extreme limits of the incision there was still some evidence of tumor tissue, doubtless leading to other parts of the body. Primary union resulted, and the patient left the hospital eleven days later.

Upon gross examination, the extirpated mass was apparently composed of two elements. One form was globular or ovoid in shape, and was somewhat translucent; the second was composed of white, convoluted, soft masses, resembling spaghetti, and corresponding in all respects to the classical description of a so-called " plexiform neuroma." Upon microscopic examination, however, both varieties appeared to be identical.

The speaker said he was indebted to Dr. F. S. Mandlebaum for the following pathological description of the specimen:

> Sections show a loosely woven, fibrous, connective tissue stroma running in all directions, individual fibres of which are often separated from each other by œdematous looking tissue. The nuclei are spindle-shaped and numerous. Small mononuclear cells are scattered throughout the section. The tumor is fairly rich in blood-vessels and capillaries; these appear to be normal. Neither the hæmatoxylin eosin nor van Gieson stains show positive nerve fibrils, but a final opinion on this point cannot be given until the Weigert preparations are finished. The general appearance of the tissues suggests either a neurofibroma or a simple œdematous fibroma of unusual type.

MEDIOGASTRIC RESECTION OF THE STOMACH FOR ULCER, WITH HOUR-GLASS CONTRACTION

Dr. William A. Downes presented a woman, twenty-eight years old, who was admitted to St. Luke's Hospital on February 8, 1914, complaining chiefly of vomiting and abdominal pain. These symptoms, from which she had suffered occasionally for several years, usually

came on directly after eating. About one year ago she had a severe attack, with hæmatemesis.

Nine days prior to her admission to the hospital her pain became more severe, and was followed by tenderness in the epigastrium. The pain was accompanied by a burning sensation. The stomach was able to retain only water; there was no blood in the vomitus. Physical examination showed that the patient was fairly developed, but poorly nourished. There was tenderness in the epigastrium, with rigidity of the recti in the upper half. An X-ray examination revealed a penetrating ulcer at the middle of the lesser curvature of the stomach, with moderate constriction, dividing the stomach into two pouches of about equal size.

On February 12, 1914, Dr. Downes did a mediogastric resection. There was an ulcer, 3 cm. in diameter, situated on the posterior wall just below the lesser curvature. This had perforated and was adherent to the pancreas. The stomach was contracted in the centre, forming an hour-glass constriction. The pylorus was normal. A segment of the stomach 3 inches wide, including the adherent portion of pancreas, was removed.

With the exception of one attack of vomiting, eight hours after the operation, the patient made an uneventful recovery.

The difficulties connected with the operation, the speaker said, were much less than he had imagined. It took about two hours. In bringing the two segments of the stomach together, he left perhaps half an inch of tissue projecting inward from the clamps. The peritoneal stitch, starting at the upper angle and continued along the posterior wall, was easily placed by rotating the clamps outward.

ANEURISM OF THE DEEP FEMORAL ARTERY FOLLOWING SUBTROCHANTERIC FRACTURE OF THE FEMUR

Dr. James M. Hitzrot presented a man, forty-seven years old, a painter, who was admitted to the New York Hospital on December 30, 1913, with the history of having fallen from a scaffold six months previous to that date, striking on his left hip. He was taken to the Knickerbocker Hospital and treated by the Steinmann extension method, and he remained there for seven weeks.

On admission to the New York Hospital he said that two months ago the thigh began to swell in the region of the fracture. The swelling rapidly increased in size and was accompanied by great pain in the

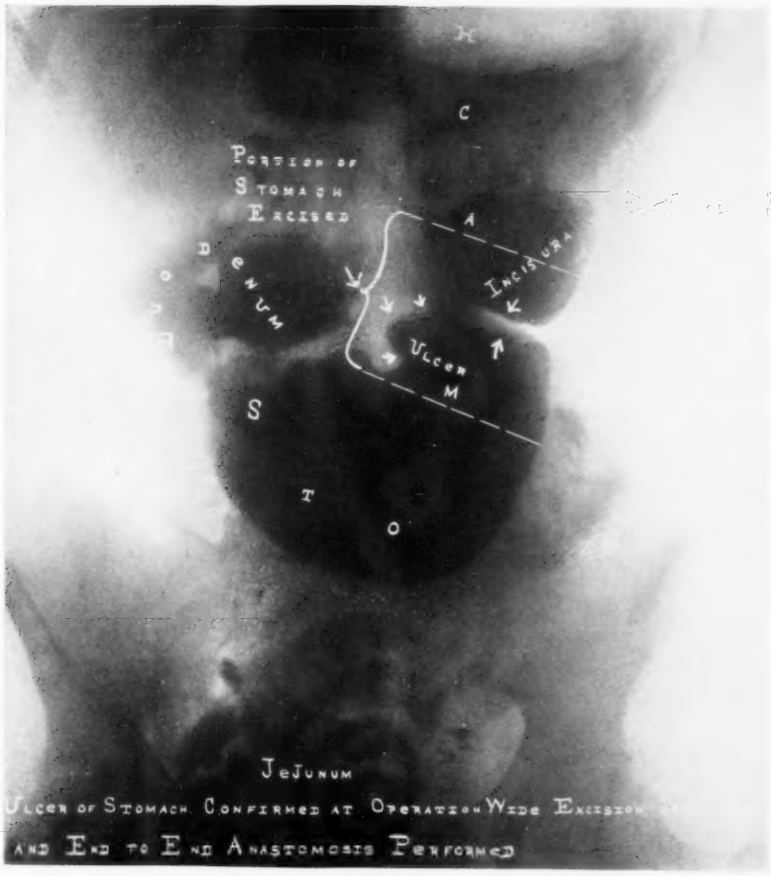

FIG. 2.—Hour-glass stomach; showing lines of mediogastric resection for ulcer.

FIG. 3.—Condition of stomach after mediogastric resection and end-to-end anastomosis.

leg, so that he was unable to walk. Recently, he had lost considerable weight.

Examination showed a poorly nourished, rather anæmic man, with a fusiform swelling over the upper third of the thigh. This swelling was smooth and firm, and somewhat elastic, and involved the inner aspect of the thigh to about its middle. It did not pulsate and was tender on handling. The circumference of the thigh over the swelling was 55 cm. The affected leg was 3.5 cm. shorter than its fellow, and flexion at the knee was limited to about 20 degrees. The X-ray showed a subtrochanteric fracture of the femur, with abduction and flexion of the upper fragment, an angulation at the site of the fracture, and some overlapping of the bone ends, which were solidly united. In the soft parts there was a diffuse swelling which did not seem to involve the bone.

Operation, January 3, 1914: An exploratory incision was made over the anterior surface of the thigh, parallel to the inner border of the sartorius in Scarpa's triangle, and was then deepened to the swelling, which was found to consist of a laminated blood clot, *i.e.*, a false aneurism. While removing the clot, an alarming hemorrhage occurred, which was controlled by compressing the femoral artery against the pubic ramus. The sac was then more widely opened, the clot rapidly removed, and the bleeding found to come from a large vessel on the internal aspect of the sac. The femoral artery in Scarpa's triangle was then exposed as it lay over the sac, and a temporary ligature placed around it. Traction on this ligature in no way affected the bleeding, whereas it was immediately checked by pressure above the pubic arch. With a curved intestinal needle a triple layer of chromic sutures were then passed through the sac wall about the rent in the artery, and the wall of the sac inverted upon the tear so as to constrict it. This stopped the hemorrhage effectively. A potential cavity then remained, which was filled with salt solution. Despite considerable pressure a cavity which held about 600 c.c. of saline solution remained unobliterated. This was packed with gauze, which was gradually removed at three sittings, on the seventh, eighth and ninth days, respectively, and the cavity filled with bismuth petrolatum. No bleeding followed the removal of the gauze.

Seven days after the use of the bismuth, the wound began to discharge, and the patient's temperature, which up to that time had never gone beyond 99, rose to 103°. The bismuth was thereupon washed out with warm olive oil, and iodine-guaiacol solution injected. A culture

made at this time showed a streptococcus viridans. The discharge ceased after the second irrigation with olive oil, four days later, when the bismuth was entirely removed. The wound gradually healed under the use of the iodine-guaiacol and balsam of Peru, and the patient left the hospital 28 days after the operation with a small, superficial granulating area in the region of the drain, which finally closed on the thirty-eighth day. The clot that had been removed at the time of the operation was sterile; there was no evidence of infection until the fourth day after the injection of the bismuth, and the infection ceased with the removal of the bismuth.

The aneurism was considered as one of the deep femoral artery or a large perforating branch of that vessel, inasmuch as pressure above the pubic arch immediately controlled the hemorrhage.

The rent in the vessel lay almost directly opposite a sharp spike on the upper end of the lower fragment and was undoubtedly produced by this bone spicule.

OSTEOMYELITIS OF THE SCAPULA

Dr. Hitzrot presented a school-girl, seven years of age, who was admitted to the New York Hospital on November 1, 1913, complaining of pain in the right shoulder, with fever and general malaise. Seven weeks before her admission she first complained of pain in the right shoulder-joint, increased by movement, and accompanied by headache, fever and loss of appetite. The pain gradually increased in intensity, the fever persisted and was accompanied by severe chills. About a week ago, a swelling was first noticed in the right axilla; this had gradually increased in size and pressure upon it gave rise to intense pain.

The patient's general history was negative. There was an indefinite history of a fall preceding the onset of the pain, but for at least three days after this injury the shoulder was used without pain.

Examination showed an enormous fluctuating swelling of the right shoulder and pectoral region. The scapula was lifted away from the chest wall, and light palpation over the axilla caused a fluctuant wave to appear close to the vertebral border of the scapula. The whole area was extremely tender; so much so, that the range of motion at the shoulder-joint could not be determined. The child's temperature, on admission, was 103°; pulse 128. A blood count showed 24,800 leucocytes, with 88 per cent. of polynuclears.

Operation, November 2, 1913: Through a long incision at the pectoral margin of the axilla the abscess was opened, and about a litre of pus evacuated. With the finger in the abscess cavity the scapula was found bare near the neck, and just above this denuded area an opening was found into the shoulder-joint through which the head of the bone could be felt to rotate. A counter-opening was then made along the vertebral border of the scapula, the shoulder-joint was opened between the deltoid and pectoralis major, the joint washed out with saline solution and a split rubber drain inserted. The patient's convalescence was uneventful, although there were still two small, superficial granulating areas near the site of the drainage tube. Motion at the shoulder-joint was restricted in all directions.

An X-ray taken after the operation to confirm the diagnosis of osteomyelitis of the scapula showed a small focus on the anterior surface of the neck of the bone, just to the outer side of the base of the coracoid process. The organism obtained in cultures from the pus was the staphylococcus aureus.

Dr. Hitzrot, speaking of the rarity of osteomyelitis of the scapula, said that Treudel, from von Bruns' clinic, reported five cases in 1279 cases of osteomyelitis observed in that clinic.

ULCER OF THE STOMACH: PYLORECTOMY

Dr. Hitzrot presented a nurse, forty-six years old, who for thirty years had suffered from indigestion and gastric pain after eating, which was relieved by a rigid diet.

On November 30, 1913, she came to the hospital as a patient of Dr. L. A. Conner, to whom Dr. Hitzrot said he was indebted for the details of her general and special examinations. The contents of the stomach, after fasting, showed bright red and altered blood, together with bloody mucus and particles of food. Hydrochloric acid 20; total acidity 40. A number of Ewald test-meals showed hyperacidity, with blood. The stools were examined at frequent intervals, and in four out of seven examinations were found to contain blood. The patient was put on a Lenhartz diet, without improvement. An X-ray showed retention of some of the bismuth at the pylorus for 24 hours after its ingestion, although the bulk passed through normally.

Operation, December 16, 1913: The stomach was explored through a median laparotomy wound, and an indurated ulcer found at the pylorus on its inferior aspect. There was a distinctly puckered scar on the antero-inferior surface of the pylorus, to which the gastrocolic

omentum was adherent. The stomach was small, but apparently normal.

The wide area of induration, the position of the ulcer and its chronicity all seemed to indicate a radical operation rather than a gastro-enterostomy. Accordingly, the pylorus and duodenum were freed and clamped, and an inch of the duodenum and about three inches of the stomach were removed. The stumps were sewn with right-angle linen sutures and inverted with a double row of chromic sutures. A posterior gastro-enterostomy was then done with clamps, and the abdomen closed in layers, without drainage. The only technical difficulty encountered was due to the contracted condition of the stomach, its small size making the performance of the gastro-enterostomy rather more difficult than usual.

The patient's convalescence was uninterrupted. On the morning following the operation she was given hot water, after which she vomited a small quantity of altered blood. Hot fluids were given in small quantities every two hours without any distress, and on the sixth day she was allowed solid food, which was well borne. She left the hospital on January 6, 1914, twenty-one days after the operation. She was now able to enjoy her meals without pain, she ate all sorts of food without discomfort, and no longer dreaded the inevitable necessity of eating.

An X-ray, taken just before she left the hospital, showed that the gastro-enterostomy opening was functionating, and that there was no gastric retention.

NEPHRECTOMY FOR CONGENITAL ADENOMA IN AN INFANT

Dr. Clarence A. McWilliams presented a female infant, who was four and a half months old at the time of her admission to the Presbyterian Hospital on December 9, 1913. The history obtained was that the child's delivery had been instrumental, she was breast fed, and with the exception of a slight cough she had always been in good health. The mother thought that the baby's abdomen was always larger than those of her other children, and about ten days before admission there was a noticeable swelling of the abdomen which increased rapidly in size.

On admission, the abdomen was found to be greatly enlarged on the right side by a smooth, spherical, non-fluctuating, firm, painless mass, about 20 cm. in diameter. It was immovable; there was no abdominal rigidity nor tympanites, and the intestines were crowded to

FIG. 4.—Adenoma of kidney, posterior view.

FIG. 5.—Adenoma of kidney, lateral view.

FIG. 6.—Adenoma of kidney, gross specimen as removed.

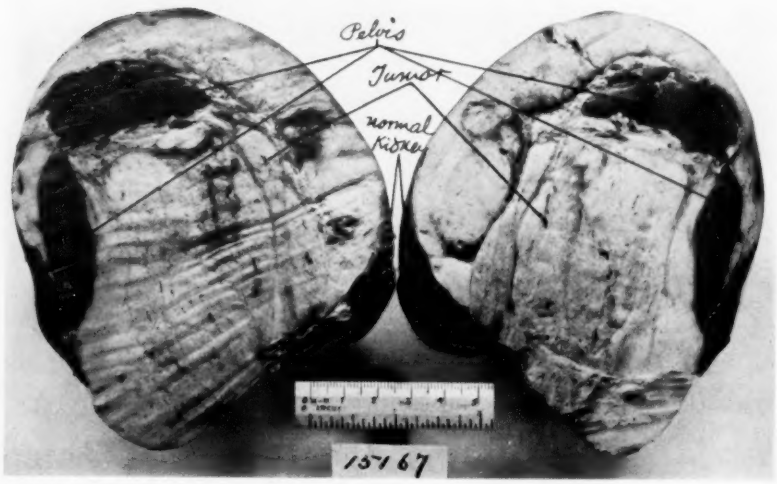

FIG. 7.—Adenoma of kidney, the specimen bisected.

the left side. It was only covered, apparently, by the thickness of the abdominal wall. Neither kidney could be palpated. The mass moved slightly with respiration. It could not be felt in the lumbar region, but by rectal examination there was a tongue-shaped mass, about 12 cm. long, with its apex pointing downward, and its base about four cm. in width. The tissue of which this mass was composed was firm and apparently homogeneous; it was painless and moved with the elastic mass just above it, with which it was at least continuous. The lowest point of the soft mass was just above the pelvic brim.

The case was regarded as one of sarcoma of the right kidney, and on December 11, 1913, Dr. McWilliams did a nephrectomy through an incision extending from the umbilicus outward to the edge of the quadratus lumborum. The gross specimen removed consisted of the right kidney, which was sharply outlined, measuring about 13 cm. x 14 cm. The surface of the kidney was smooth, excepting in the area adjacent to the hilum, where there was a certain amount of loose tissue which could be readily separated from the balance of the specimen. On cut section, the entire kidney was found to be made up of a white, homogeneous, soft, soapy material, apparently a tumor, while underneath the capsule, on either side of the periphery of the tumor which presented in the pelvis, there were two solid areas which formed a part of the kidney and were sharply separated from the balance of the tumor proper. Upon injection, cut section showed that the tumor mass extended into the ureter, which was markedly distended and curved upon itself. Pathologically, the tumor proved to be an adenoma of the kidney, with hyperplastic infiltration of the adjacent lymph-nodes.

The operation was followed by a temperature elevation to 104°, with a pulse of 166. After two days the temperature and pulse abruptly fell to normal and remained so. The condition of the wound was entirely satisfactory, and healed primarily excepting at the point of drainage. This area was now granulating satisfactorily. The patient was discharged on December 27, 1913, and was now in excellent condition.

Dr. Moschcowitz, in connection with the case presented by Dr. McWilliams, showed the specimen from a similar case upon which he had operated about two years ago. The patient was a child of two years that had been injured in falling off a chair. When Dr. Moschcowitz saw the patient, a week after the accident, there was a tumor in the left lumbar region, and he made the diagnosis of rupture of the kidney. The child was sent to the hospital, and upon operation a very

peculiar looking kidney was exposed. It was almost cut in half by a large rent, and in the kidney itself was a mass resembling fatty tissue. Death occurred shortly after the operation. The case proved to be one of adenomyosarcoma of the kidney, so-called Wilm's tumor.

These tumors of the kidney, the speaker said, were usually of a mixed type and were very rare.

ACROMIOCLAVICULAR DISLOCATION

Dr. Burton J. Lee presented a boy of nineteen who, while tackling a runner in a game of football, suffered an injury to the right shoulder, the arm being almost completely dislocated. When he was seen by Dr. Lee, about three hours after the injury, an examination revealed a dislocation of the outer end of the clavicle, upward and backward, forming a distinct projection on the outer aspect of the shoulder region. An attempt to reduce the dislocation failed and the arm was temporarily placed in a splint. A second attempt to reduce the dislocation also failed, it being impossible to replace the clavicle completely into its normal position. There was a distinct deformity, with a projection of the outer end of the clavicle upward and backward behind the joint, and a considerable loss of function in the corresponding shoulder-joint.

The patient was admitted to the New York Hospital, and was operated on October 13, 1913. A vertical incision was made from the right acromioclavicular joint downward to the tip of the coracoid process, over the anterior aspect of the joint. This was deepened through the deltoid muscle to the joint region, and the arm replaced nearly into position, but not completely so, the interarticular cartilage apparently forming a definite obstruction. This was therefore removed. The joint surfaces of the clavicle and scapula were then denuded of cartilage with a sharp curette, as it seemed wise to attempt to obtain a firm, fibrous ankylosis which would serve to keep the bones in position after the absorbable suture material had disappeared. A few fibres of the outer end of the trapezius muscle at their attachment to the posterior border of the outer third of the clavicle were then divided, permitting easy replacement of the clavicle in apposition with the acromion process. Three kangaroo tendon sutures were then placed, one through the coraco-acromial ligament and through the clavicle; a second through these same structures, but further outward, and a third through the coracoid process and around the clavicle, holding the bone firmly downward and lying between the first two men-

tioned sutures. This held the clavicle in perfect apposition with the acromion process. The wound was then closed with catgut for the muscles and continuous silk externally.

The special features of this operation, Dr. Lee said, were the incision from the joint to the tip of the coracoid process, affording free access; the removal of the interarticular fibro cartilage; the denudation of the joint surfaces of cartilage, paving the way for subsequent fibrous ankylosis; the division of a few fibres of the trapezius muscle on the posterior aspect of the clavicle; and, lastly, the three sutures of absorbable material.

The after-care of the patient was simple. The arm was put up in abduction in plaster coaptation, and the patient was kept in bed for two weeks. At the end of three and a half weeks the splint was definitely shortened below, and the arm was placed in a sling. The plaster was taken off five weeks after the operation, and very mild passive and active motion was then instituted.

On January 15, 1914, the result seemed perfect. There was no deformity, function at the joint was normal, and he could hold his arm erect above the shoulder.

Dr. William Darrach said he wished to emphasize the statement made by Dr. Lee that in these cases of acromioclavicular dislocation, the crucial point to keep in mind was the rupture of the coracoclavicular ligament, and unless this ligament was repaired, the dislocation was apt to recur. In Dr. Lee's case, this was done by the third suture, which he passed through the coracoid process and around the clavicle.

As to the choice of an incision in these cases, the speaker thought the incision over and parallel to the clavicle gave just as good an exposure as one made at right angles. In one of his own cases, operated on several years ago, the removal of the articular cartilage and the meniscus, proved successful. Fibrous union was obtained and there was a satisfactory functional result. Dr. Darrach said that he had seen the coracoclavicular ligament ruptured in five cases.

OSTEOMYELITIS OF THE OS PUBIS

Dr. Lee presented a woman of forty whose general health had been good, and who never had any serious illness up to the present time. When she came under Dr. Lee's observation, on July 17, 1913, she stated that four weeks ago she was taken ill with pneumonia. A week later a small, painful swelling developed in the suprapubic region. Iodine and olive oil were applied at frequent intervals without afford-

ing relief, and the swelling gradually increased in size. Examination showed marked tenderness over the pubic bones, more pronounced on the left side. There was slight induration in the subcutaneous tissue over the same area.

Operation: Two incisions were made directly over the summit of the os pubis, and deepened down to the aponeurotic layer. On incising this, a pus cavity was entered containing two or three ounces of thick, greenish pus. Extending out on either side of the pubic bone there was an erosion on the right side of the summit of the horizontal ramus of the os pubis, and a second erosion on the left side, near the symphysis. These areas were curetted, and the one on the left side enlarged with a gouge. A small gauze drain was inserted down to the summit of the bone, and a few interrupted sutures of catgut inserted at the angles of the wound. The patient made a good recovery.

Bacterial culture of the pus showed streptococci. On account of the recent history of pneumonia, the case was at first regarded as one of pneumococcus osteomyelitis, but this was disproven by the bacteriologic findings.

A CRITICAL ANALYSIS OF THE TREATMENT OF FRACTURE OF THE NECK OF THE FEMUR

Dr. Royal Whitman presented a paper with the above title, for which see page 484.

Dr. L. W. Hotchkiss said that at the Bellevue Hospital they saw many cases of fracture of the neck of the femur in old women. They formed a class of patients which were not regarded with particular favor, as the treatment extended over a long time, and the outcome, as a rule, was not very promising. Since they had adopted this abduction method of treatment, however, as described by Dr. Whitman, they had commenced to take a new interest in these cases, and the results had been distinctly better. By this method, function was restored and union secured, and in many instances the results were unexpectedly gratifying. Some of these patients were in such poor physical condition that the use of a general anæsthetic was contra-indicated, but by this method it was often quite possible, in dealing with recent fractures, to secure sufficient abduction extension without an anæsthetic.

Dr. H. H. M. Lyle said he had treated six cases of fracture of the neck of the femur in elderly people by Dr. Whitman's method. In one, the fracture was of three months' standing before it was recognized. In that patient, who was still under treatment, they were apparently getting union. These patients ranged in age from 60 to 70 years. In

one of them death occurred from an embolus. One of the great advantages of this method of treatment was the comfort enjoyed by the patients, and it was also appreciated by the nurses who had charge of these cases.

DR. HITZROT said he had found this method extremely satisfactory in those cases involving the narrow part of the neck, but not involving the trochanter. In some of the cases he had seen at the New York Hospital, in which the trochanter, especially the greater trochanter, was involved, the results of forced abduction were not as satisfactory as in others.

DR. ROBERT H. M. DAWBARN said that in recent cases of fracture of the neck of the femur, while exudate of callus is still possible, he thought the method of treatment described by Dr. Whitman was ideal, but what were we to do in the late cases, in which the period of exudation had long gone by? In those cases his own method of treatment was to expose the joint; bring the fragments into apposition and hold them together by driving an aluminum spike through the neck and into the head. To excite an exudate of callus, he makes an injection of the glycerite of tannin, which he had found the most efficient of all plans; more efficacious than Bier's use of injected blood without its drawbacks. In one case where he employed this method, the patient was 82 years old, a patient of Prof. W. H. Thompson, who was present at the operation. The old lady was ultimately able to go down and up two flights of stairs as well as before her fracture.

DR. JOHN B. WALKER said that his experience with this method at Bellevue, where they saw a large number of these cases, had been very satisfactory. With the aid of the extension apparatus, which he considered preferable to the help of an assistant, he had been able in many of his cases to apply a serviceable splint without the use of an anæsthetic.

DR. FRANK S. MATHEWS asked Dr. Whitman about what percentage of cases he had found suitable for this method of treatment. Also, in regard to its use in young and old patients. In persons who were very fat, especially in the region of the lower abdomen and buttocks, he had been unable to apply the plaster so that it fitted satisfactorily after they were returned to bed.

DR. WALKER said that in 100 of their cases, 40 per cent. were under 50 years of age. Personally, he had had five cases in persons under the age of twenty.

DR. GEORGE WOOLSEY said he had seen several excellent results by this method, even in patients well advanced in years. In one of his

cases the method was successfully applied ten weeks after the receipt of the injury in a patient about 27 years old. In this case he had Dr. Whitman's assistance. He asked Dr. Whitman if he advised it in very old and more especially in very decrepit patients, who, if kept in the supine position, were apt to become more and more delirious and to die in a short time.

Dr. Whitman, in closing, said that "to break up an impaction," if this implied the violent separation of adherent fragments, with no adequate means of again apposing them, was doubtless an improper procedure.

The correction of deformity by the abduction method could be accomplished easily by gentle manipulation, secure fixation being immediately assured. Such correction was essential to restoration of function and was furthermore the best means of promoting repair, since the fractured surfaces were placed in proper relation to one another.

In reply to Dr. Hitzrot, Dr. Whitman said that the method was as efficacious in fractures at the base of the trochanter as elsewhere. That anæsthesia, although not absolutely essential, was indicated usually in order to assure the relaxation of the adductor muscles whose contraction might prevent the proper degree of abduction.

As to the age limit, he thought that the abduction method had a great advantage in the treatment of older patients, since it did not require rest upon the back and permitted frequent changes of posture. Thus, bed-sores and hypostatic congestion might be eliminated as complications. That day, for example, he had applied it to a patient 84 years of age as the only practicable means of relieving pain, and which at least provided an opportunity for repair.

In reply to Dr. Mathews, Dr. Whitman said that fat patients were difficult subjects for any treatment. In such cases one must depend upon the internal fixation assured by the reduction and by the attitude of abduction, rather than on the accurate fixation of the plaster splint.

It seemed to him that it was most important to establish a standard treatment for favorable cases, in which, under the present conditions, the results were but little better than in the unfavorable class. From this stand-point he would urge the adoption of the abduction treatment because it was based on surgical principles and was the only method by which in a comprehensive sense these principles might be applied.

CARCINOMA OF THE ŒSOPHAGUS

Dr. Kammerer showed the specimens of a case of carcinoma of the lower end of the œsophagus in which a metastasis had formed

between the trachea and the œsophagus at the level of the manubrium of the sternum. At that point a shadow was found in the X-ray picture. The secondary tumor had compressed the œsophagus and trachea, causing severe dyspnœa, and had finally perforated the tracheal wall, whereas, the primary growth had probably produced no symptoms at all.

INSTRUMENT FOR SECURING REPOSITION OF A FRACTURE

DR. HITZROT showed an instrument which could be adjusted to the fragments of a fractured bone to bring them into proper alignment.

The instrument consists of an ordinary mechanical jack which is fastened to the eccentric projecting bar of the lock of two Lambotte clamps by thumb screws. It is applied by first placing one clamp, with the jack attached, to one fragment. Then the second clamp is fastened to the other fragment and so adjusted that the threaded bolt on the jack can be passed through the opening on the lock of the clamp, to which it then is fastened by a thumb screw. By moving the lever of the jack, pressure is exerted against the clamps in such a manner that the two ends of the bone are jacked apart. When the overriding is overcome the ends are manipulated into position by the clamps, the thumb screws tightened and the bone ends are then held in the desired position.

The jack had been successfully used in two cases of fractured femurs. It was designed to obviate the ordinarily violent physical efforts necessary to overcome the overriding in old or recent fractures of the larger long bones and also to keep the mechanical means for doing so directly in the hands of the operator.

Stated Meeting, held at the New York Academy of Medicine, March 25, 1914

The President, DR. FREDERIC KAMMERER, in the Chair

MUSCULOSPIRAL NERVE REUNION TWENTY YEARS AFTER NERVE WAS SEVERED

DR. ROBERT H. M. DAWBARN presented an elderly man who was sufficiently leisurely in his decisions to wait twenty years after a fracture of his left humerus, with complete rupture of the musculospiral nerve in its groove and the usual paralysis accompanying, before deciding to ask for surgical relief.

In this case the severed nerve ends were at length found and united. This was but three months ago, and the man now insisted that his forearm and hand felt warm for the first time in these years; also, the æsthesiometer noted distinct improvement in common sensation. As yet, of course, it was too early to expect motor results.

EXCISION OF THE ELBOW-JOINT

DR. DAWBARN presented a woman to show the result of excision of the elbow after a comminuted fracture of the humerus and bony immobility. The patient was first seen by a competent surgeon, who operated by Langenbeck's method, splitting the triceps, which was chiselled off of the olecranon, its insertion into the periosteum being saved. One-half of this triceps end and a portion of the supinator longus were turned in between the joint surfaces after considerable bone was removed, but the result was almost complete rigidity.

The patient was subsequently seen by Dr. Dawbarn, who did the operation as formerly taught, but with the removal of the entire lower end of the humerus, from three to four cm., preserving the triceps insertion, as before, on the remaining half. After this operation, as was demonstrated, the motion obtained was excellent in all directions.

Dr. Dawbarn commented upon the teaching of the late Dr. McBurney, who used to advocate very wide removal of bone ends, if excision was attempted at all. Dr. McBurney stated that in his entire experience of many years he had personally had but one case of a "flail-joint" at the elbow, and in that instance the patient had declined a second operation and had made his escape from the hospital.

DR. KAMMERER said that during the earlier years of his experience, while working in the clinics of Germany, he had seen many cases of excision of the elbow-joint for tuberculosis. That a flail-joint now and then developed after resection could not be denied, especially after extended removal of bone. In such instances it was questionable whether we should try to get a movable joint, or not. He had seen both methods followed by eminent surgical authorities and he certainly believed that a firm ankylosis, at a little less than a right angle, was preferable to a flail-joint or a nearthrosis with a limited range of motion in a more or less extended position of the elbow.

OPERATION FOR FLAT-FOOT

DR. DAWBARN presented a man to illustrate the result of operation for flat-foot. The operation consists of the division of the calcaneum

by the Gigli wire saw, from just in front of the tendo Achilles, downward and forward; then sliding the heel, thus loosened, downward and inward as far as possible, and nailing it to the rest of the same bone by a long wire picture nail. The result gives a new angle of support to the heel, and beautifully restored the arch.

Dr. Dawbarn said that after several trials he preferred this method to the Ogston operation. A plaster-of-Paris bandage was applied and left on for six weeks for bony union. For the first three weeks the patient was not allowed to walk at all.

DOUBLE HALLUX VALGUS

DR. DAWBARN presented a man upon whom he had operated for this condition by a method which was simplicity itself. It left very little shortening, not over one centimetre. Also, it left a new, comfortable false joint, and the scar was so placed that it was not subjected to pressure. The work was done after thigh constriction, using Schede's moist blood-clot method. A flap, U-shaped, with the convexity just touching the long extensor tendon, was made, the uncut part toward the inner side. With the Gigli saw the head and neck of this metatarsal bone were excised. That was all. The sesamoid bones were not touched, nor was the base of this first phalanx nor the long tendon; not even the bursa, unless suppurating. In that case it must be excised as a primary and wholly separate operation. The plaster-of-Paris splint was removed in six weeks for the first and only time. During the first half of this period no walking was permitted, and the foot was kept elevated.

DR. PARKER SYMS said that what was desired by this operation was to give the patient a comfortable foot, and with that end in view it was very important that the scar should not be carried to the inner side of the toe. For this purpose he employed a straight incision made over the dorsum of the toe, well away from the inner side, so that the shoe could not make pressure on the scar. Many of these cases would require an operation such as the one Dr. Dawbarn had described, namely, a resection of the head of the metatarsal bone, but the speaker said he did not think it necessary, in the majority of these cases, to do an elaborate operation like the one described by Mayo or Weir. A bunion was simply an inflamed bursa, and would be relieved when the pressure was removed, by removing the offending prominence of bone.

DR. JOHN F. ERDMANN said he did not think it made any particular difference where the scar lay. He usually made his incision on the inner aspect of the toe, and he had never seen any trouble from the

resulting scar. He invariably dissected out the entire bunion, and did a subperiosteal resection, as in Dr. Dawbarn's case.

DR. GEORGE WOOLSEY said he usually did the Mayo operation, which he did not regard as elaborate, and quite as ideal as the one described here to-night. He did not think it was necessary to remove so much bone. The results are most satisfactory.

DR. DAWBARN, in closing, said he considered his method of treating hallux valgus a most simple and satisfactory operation. It could be done in ten minutes. He never dissected out the bursa unless there was suppuration, and then he did the operation in two stages a month apart. If it was considered good technic to make an incision on the inner side, where the shoe would cause pressure, then it was equally good technic to make an incision on the under surface of the toe. There were two objections to the method mentioned by Dr. Syms: one was that it retained the entire length of the flexor longus tendon and was apt to maintain the bad angle. The other objection was that it violated Bier's principle, in that it left an end-bearing bony surface free of periosteum and exposed to pressure.

COMPLICATED FRACTURE OF THE HEAD OF THE RADIUS

DR. WILLIAM DARRACH presented a man, thirty years old, who on March 8, 1913, while riding on a high tower trimming wagon, repairing electric lights, was struck across the chest by a telephone wire which ran across the street. This knocked him off the tower to the street, a distance of about eighteen feet. In his fall he grasped a telephone wire, which broke with his weight, and he could not describe his exact position on landing.

On examination, five hours after the receipt of the injury, there was a prominence on the dorsal aspect of the elbow due to backward displacement of the radius and ulna, with a hollow on each side of the triceps tendon (Fig. 1). There was a wound over the inner aspect of the elbow, but no bone protruding. The elbow was flexed at right angles, with scarcely any active motion. At the wrist there was a markedly exaggerated silver-fork deformity, the carpus and hand being carried well dorsad, with marked prominence anteriorly of the lower end of the upper fragment of the radius and dislocated head of the ulna.

Under ether, the elbow was easily reduced by extending and then pulling the forearm forward, but with its reduction distinct crepitus could be felt, which seemed to be more on the outer aspect of the joint. The wrist fracture was reduced in the same way by extension first and then forward pressure, followed by flexion. An X-ray, taken after the

FIG. 1.—March 8, 1913.

FIG. 2.—May 14, 1913.

FIG. 3.—November 26, 1913.

reduction, showed that the radial fragments were markedly displaced, one lying well to the inner side of the coronoid (Fig. 2).

On March 14, 1913, under gas and ether, an incision was made over the dorsolateral aspect of the joint, and two of the fragments were removed. A third fragment, however, the one lying most to the inner side, could not be found, and a well protected finger being inserted in search of it revealed a marked laceration of the anterior ligament and the overlying brachialis anticus muscle. The broken surface of the remaining portion of the radial head was found to lie in relation to the lesser sigmoid cavity, so the rest of the head and the neck were removed. The stitches were taken out on the twentieth day, union then being solid, although the wound inflicted at the time of the injury did not close until six and a half weeks later. At this time, April 23, 1913, at the elbow there was flexion to 80°, extension to 115°, with 25° of supination and 30° of pronation. At the wrist there was flexion to 135° and extension to 185°.

On May 7 the elbow showed flexion to 75° and extension to 135°, with 30° of supination and 60° of pronation. The wrist showed flexion to 135° and extension to 190°. An X-ray at this time showed that the fragment of the radial head which had been left behind had acted as a nidus for further growth of bone tissue which extended upward into the substance of the brachialis anticus. The patient was again sent to the hospital, and on May 16, 1913, under novocaine, an incision was made along the outer margin of the pronator teres, and deepened to the brachialis anticus. A bony mass was found firmly imbedded in this muscle and attached to the coronoid process. Gas was then administered, and the greater part of this bony new growth was removed with rongeur forceps and a sharp spoon. The wound was then closed, and a starch bandage applied, with the elbow at 90°. Motions were begun ten days later. On June 28, 1913, the elbow showed flexion to 45° and extension to 140°, while pronation and supination were each limited one-fourth. The wrist showed flexion to 130° and extension to 225°. On November 26, 1913, there was flexion at the elbow to 45° and extension to 150°; pronation and supination, each 70°. The wrist showed flexion to 120°, extension to 210°, adduction 10° and abduction 30°. The mass in the antecubital fossa was much smaller (Fig. 3). The patient now complained only of pain along the ulnar head, and a vague soreness in the region of the elbow on rainy or very cold days. On March 19, 1914, there was flexion at the elbow to 40°, extension to 150°, pronation and supination each 70°. There was no pain except a moderate amount at the inferior radio-ulnar joint.

Dr. Darrach said the following points of interest were to be noted in connection with this case: 1. The association of fracture of the radial head with the dislocation at the elbow. 2. The displacement of the fragments of the radial head, this being the indication for operation. 3. The intact portion of the radial head being so situated that the broken surface faced the lesser sigmoid cavity. This formed the indication for removal of the rest of the head and neck. 4. The loose fragment escaping from the joint cavity through the torn anterior ligament and lodging in the substance of the brachialis anticus. The further growth of bone from this nidus, corresponding with other instances of myositis ossificans. The cessation of growth after incomplete removal of this mass. 5. The anterior dislocation of the ulnar head, associated with Colles's fracture. This he believed to be of rather common occurrence and frequently overlooked. 6. The present disturbance at the inferior radio-ulnar joint, due to the relative lowering of the ulnar head. Ordinarily, this condition could be greatly benefited by an ostectomy of the lower extremity of the ulna, but in view of the previous removal of the radial head and neck, the procedure seemed questionable in this instance.

RUPTURE OF THE AXILLARY ARTERY AND VEIN, WITH INJURY TO THE FIFTH AND SIXTH CERVICAL NERVE-ROOTS AND COMPRESSION OF THE BRACHIAL PLEXUS

Dr. John A. Hartwell presented a young man, a chauffeur, who, in June, 1913, while sitting on the floor and running-board of an automobile travelling at high speed, met with a collision and was hurled from the car. He was uncertain as to the exact way in which he received the injury, but on careful questioning it appeared that he was thrown bodily free from the car and, in trying to save himself, he grasped some portion of the car with his right hand. This resulted in a violent abduction and extension of the entire right arm, the car travelling in one direction and he being hurled with great force at an angle, producing a powerful tearing violence in the region of the right shoulder girdle. He was picked up from the roadside, and taken immediately to the hospital.

Examination showed complete paralysis, both motor and sensory, of the entire right upper extremity, including the shoulder girdle muscles, and loss of pulsation in the entire extent of the axillary, brachial, radial and ulnar arteries. There was no evidence of any external injury, and very little tenderness around the upper extremity. There was no hæmatoma. He was kept under observation in the hospital for six weeks, during which time there was no change in his condition excepting the development of very marked atrophy of the muscles over

the shoulder, and, to a lesser extent, those of the arm and forearm. There was practically no return of motor function, but there was a slight return of sensation along the radial distribution in the hand. At no time was there any suspicion of gangrene from the apparent loss of circulation, and there always seemed to be sufficient blood in the fingers. The pulse, however, never returned.

Operation, August 15, 1913: An incision was made in the upper part of the neck to expose the origin of the cervical nerve roots, and at this point it was found that the fifth and sixth roots, after their emergence from the intervertebral foramen, showed definite thickening from an inflammatory exudate. It was not deemed advisable to open the vertebral canal, but the tension of the roots was relieved by making parallel, longitudinal incisions into the tumified nerve-trunks.

A second incision was then made in the pectoral region. A part of the pectoralis major muscle was divided, and the pectoralis minor drawn toward the midline. This gave an effective exposure of the infraclavicular structures. The axillary vein was found to be completely ruptured and the ends sealed by an incurling of the vessel. The axillary artery, for a distance of about two inches, was represented by a fibrous cord, and there was no pulsation in the artery beyond this point. The structures of the brachial plexus were bound down by very firm scar tissue, pressing them against the first rib. This scar tissue was dissected off, giving entire freedom to the brachial nerves. No attempt was made to repair the vessels, but great care was taken throughout to cut no vessels that might be taking part in the anastomotic circulation.

Since the operation the patient had regularly received massage and electrical treatment throughout the whole extremity. There had been a very marked return of both motor function and sensation to all parts excepting those supplied by the fifth and sixth roots. There had been no return of pulsation in any part of the artery. There was a persistent paralysis of the supraspinatus, the infraspinatus, the deltoid, the teres major and minor, and, to a lesser extent, of the muscles of the upper and forearm. However, since the paralysis was not complete and seemed to be slightly improving, it was evident that the fifth and sixth roots were at least partially functionating, and there was therefore hope that still further improvement would take place and that the patient might ultimately have a fairly useful arm.

The unusual features of this case which made it worthy of record, Dr. Hartwell said, were the two distinct lesions of the nerves; first, at their origin from the cord, and, second, in the infraclavicular region.

The complete rupture of both artery and vein with the immediate establishment of a collateral circulation, was also an unusual feature. It was apparent that the artery was so stretched that all of its coats excepting the adventitia had ruptured, and the curling up of the inner coats prevented either aneurism or hemorrhage. In most of the reported cases of similar injuries, gangrene had either supervened or at least threatened.

Dr. Arthur L. Fisk said that some fifteen years ago, at a meeting of this Society, he presented a young man, a plumber's helper, who was struck on the right shoulder by a falling pipe. He was taken to a hospital, where a diagnosis of fracture of the clavicle was made. Subsequently, he was transferred to the Trinity Hospital, where it was noted that he had no sensation in the hand on the affected side, and that there was no fracture of the clavicle. Operation revealed a complete rupture of the brachial plexus, together with the subclavian artery and vein. The vessels had been crushed, and there was no hemorrhage into the tissues. Gangrene finally set in, and the arm had to be amputated. No shock nor hemorrhage attended this operation. In this case, as in the one shown by Dr. Hartwell, there was no external evidence of injury.

Dr. Erdmann said he was recently called upon to amputate at the shoulder the arm of a young man of 23 who was injured in a street-car accident. Following the injury, there was a large swelling at the shoulder, with complete loss of motion and sensation, and absence of pulsation. The arm was thoroughly blanched. A high amputation was refused until thirty-six hours after the injury, when gangrene was well advanced. Upon splitting the pectoralis major, a small blood clot was found; otherwise, there was no evidence of hemorrhage. The axillary artery had its inner coats torn and crushed, and the veins were completely severed. The condition of the brachial plexus was not made out, but there was probably an evulsion of the nerve-roots.

Dr. Taylor said that in the case shown by Dr. Hartwell most of the trunks of the brachial plexus were involved in the large cicatrix, which probably accounted for the paralysis of the lower part of the extremity and also for the improvement that had occurred. The marked atrophy of the infra- and supraspinatus pointed to injury to the fifth and, possibly, to the sixth roots. The disability of the shoulder muscles would probably be permanent.

Dr. Hartwell, in closing, said the arm showed no evidences of gangrene or interference with the circulation, barring the fact that there was a complete absence of pulsation. One could see by the coloring of the nails that there was some blood supply. The absence of the

pulse was at first attributed to a possible anomaly in the course of the blood-vessels.

Dr. Fisk said that in his case there was some circulation in the arm for two days after the injury, probably due to some collateral circulation.

EXTRADURAL CYST IN SPINAL CANAL

Dr. Alfred S. Taylor presented a girl who was sixteen years old at the time she was operated on in May, 1913—about ten months ago. For eighteen months preceding that date she had increasing difficulty in locomotion, with dragging of the right foot and leg, until she finally became bedridden. There was no history of pain, but at the time of the operation there was complete spastic paraplegia, with marked increase of the reflexes of the lower extremities, and hypæsthesia up to the level of the fifth intercostal space on the left side and to the level of the fourth space on the right side. The patient was seen by Dr. Charles L. Dana, who thought that while the presence of a spinal tumor was not positive, an exploratory operation was well worth while.

On May 22, 1913, Dr. Taylor did a right hemilaminectomy, including the fourth, fifth and sixth dorsal vertebræ, and exposed an extradural cyst, which was enucleated. The dura was not involved, and after puncture was left alone. The patient made an uneventful recovery, and within three or four weeks after the operation she was able to move the toes and feet. From that time on her progress became more rapid, and she could now walk about with perfect freedom. There was no ataxia nor other disturbance. The symmetry and mobility of the spine had not been impaired by the operation.

LAMINECTOMY FOR SPINAL TUMOR AND OTHER SPINAL DISEASES

Dr. Charles A. Elsberg presented a number of patients in order to show the results that could be obtained after operative interference in various spinal conditions.

The first patient was a woman from whom he had removed a glioma which pressed upon the cord at the tenth dorsal segment. The patient had severe root pains over the left lower abdomen for two years and had been treated for various diseases for several years before the real nature of her trouble had been recognized. The removal of the tumor was followed by a rapid disappearance of the symptoms, so that within three weeks she was practically free from any complaints.

The second patient was a woman who had a typical Brown-Sequard syndrome, with indefinite signs at the sixth dorsal level. At the opera-

tion, a small extramedullary growth was removed. Here again the improvement was rapid. A complete paralysis of the left lower extremity had existed before the operation, but within four weeks, the patient was able to walk, and in two months had entirely recovered.

The third patient shown had been operated upon less than six weeks ago, and a fibroma removed from the tenth dorsal segment. The patient had been almost completely paraplegic before the operation. The recovery in this case was very rapid, so that the patient could be presented walking around without assistance, and with practically no evidence of the former paralysis.

Another patient had an intramedullary growth at the level of the sixth cervical segment which had been removed by Dr. Elsberg ten months before by means of the extrusion method. This patient had been quadruplegic before the operation, and she was presented in order to show how good a result could be obtained by the extrusion method of treatment of intramedullary tumors.

Another patient was shown who had been operated upon twice for an extradural tumor which had caused marked compression paraplegia of all four extremities. The patient improved very much after each operation, so that she was able to walk around alone and make considerable use of her hands and fingers. At the first operation, a small extradural tumor was removed, and the bleeding from the bone controlled by means of bone wax with which the entire cavity in the bone was filled. The patient improved astoundingly and remained in good condition for about one year. Then the symptoms rapidly returned, and, at a second operation, a tumor was found which again compressed the cord. The tumor mass was found to consist of the wax which had been inserted at the previous operation and which had been pushed out of its bed by a recurrence of the tumor growth. The wax was removed, together with as much as possible of the tumor, and marked improvement followed.

Another patient presented a spastic paraplegia and all of the symptoms of a spinal tumor at the level of the second dorsal segment. At the operation, a very marked localized thickening of the dura was found which had caused the pressure upon the cord. Over an area of about one inch, the dura was at least one-half inch thick. Excision of the thickened dura was followed by steady improvement. There was no history of syphilis in this patient, and the Wassermann reaction was negative. The diseased tissue that was removed was reported by the pathologist as chronic inflammatory tissue. Dr. Elsberg declared that the condition found was a most unusual one.

A case of unusual interest presented by the speaker was one of a young man who had suffered for the best part of one year with steadily increasing symptoms of spastic paraplegia. He had been in the N. Y. Neurological Institute several times during the year, and was considered a case of multiple sclerosis. Finally, he was bedridden, with tremendous spasticity of both lower extremities, but with only slight disturbances of the pain and the temperature sense. As there was some slight evidence of level symptoms, and because the patient begged to be given the smallest chance for relief, an exploratory laminectomy was done. The seventh, eighth, ninth, and tenth dorsal spines and laminæ were removed, and the dura widely opened. Nothing abnormal was discovered, although the spinal cord felt somewhat irregular and "lumpy." The patient was presented practically free from all of his symptoms; he was able to be about and to walk ten miles at a time. The speaker stated that he had seen a similar remarkable result in two other patients with probable multiple sclerosis: he did not attempt to explain the reason for the improvement, but stated that Dr. Bailey and he had considered that the entrance of air into the dural sac might cause a profound influence upon some pathological cord conditions, and in a paper by Bailey and Elsberg on "Decompressive Laminectomy" their views had been set down in detail.

Finally, a physician was presented who had suffered a fracture of the cervical spine with compression paraplegia three days before she was operated upon. The operation showed that the spinal cord was compressed by the laminæ of the sixth and seventh cervical vertebræ, and steady improvement followed the removal of the fractured bone and a wide laminectomy.

LAMINECTOMY FOR SPINAL TUMOR

Dr. Charles A. Elsberg read a paper with this title, for which see page 453.

Dr. Foster Kennedy (by invitation) said he had had the opportunity of examining many of the cases reported by Dr. Elsberg, and he felt, with the reader of the paper, that the outlook for operative interference in many conditions of the spinal canal and cord was exceedingly hopeful. This was well illustrated by the results obtained by Dr. Elsberg, and one of the most striking instances was the case of syringomyelia with the formation of a definite intramedullary cyst, which was operated on by incision into the posterior columns. There was no other treatment for such conditions other than that described by the reader

of the paper, and the successful outcome of the operation in the case referred to justified their anticipations for other cases. Syringomyelia, in the text-books, was described as invariably due to an embryonic defect, but we would probably be forced to modify our views with regard to this disease, which was much more common than was formerly imagined. The symptom-complex which went by the name of syringomyelia was a clinical rather than a pathological entity, and its symptoms could be produced by varying conditions of the cord. Dr. Kennedy said he had under his observation at present a woman with the history of lues, who recently developed a condition which could only be called syringomyelia and which he hoped might be successfully treated by operation. A hæmatomyelia might produce a similar clinical picture, particularly in cases of syphilitic origin. The same was true of endarteritis producing an anæmia of certain segments of the cord, with the breaking down of certain elements of the cord and the production of a cyst, and the speaker said he had no doubt that such a condition was amenable to skilful operation. With a hæmatomyelia, however, operation was not necessarily indicated, as improvement in the symptoms might be expected.

When we came to the diagnosis of spinal lesions, we found in the text-books a number of fairly well defined rules by which we could distinguish between extra- and intramedullary tumors and other conditions. By exercising the greatest care, it was usually possible to say precisely at what level the cord was involved, but that did not throw much light upon the character of the lesion, and while we could theorize indefinitely in favor of this or that lesion, the final court of appeal often lay in an examination of the cord itself. Formerly, Dr. Kennedy said, he looked upon laminectomy as a serious major operation. It still was to be so regarded, but he had now seen so many of these operations and with such success that he had come to the conclusion that where we had to deal with a spinal cord lesion that gave rise to definite symptoms of compression at a definite level, then a surgeon should be called in.

Dr. George Woolsey said that in one case that had come under his observation, there was no nerve-root pain and little sensory disturbance, although a large tumor was found extending under five or six laminæ on the dorsal aspect of the cord in the cervical region. This patient, for nine years, had suffered from increasing motor symptoms. The tumor was a small-celled sarcoma and the case was the only one that resulted fatally. In a case of extradural fibrosarcoma, the only extradural case he had operated on, there was a recurrence within a year after

the removal of the growth. It was again removed and a second recurrence was confidently looked for, but the patient was now well, eight and a half years after the second operation, with the exception of a slight spasticity involving the left arm and leg.

The results in these cases, as emphasized by Dr. Elsberg, depended largely on the patient's condition and the length of time that pressure had been exerted on the cord. In one of Dr. Woolsey's cases the symptoms of pressure dated back for twelve years, and still considerable improvement had resulted from the operation. He had seen relief of symptoms from laminectomy when no tumor was found, but not to the same extent as in the remarkable cure shown by Dr. Elsberg. The speaker said he could recall a few cases of extramedullary tumor with symptoms simulating those of an intramedullary growth in respect to dissociated anæsthesia. In several cases, on exposure of the cord, the growth at first appeared intramedullary until a division of several layers of condensed arachnoid tissue disclosed an extramedullary growth.

Dr. Taylor said that twenty years ago a laminectomy was regarded as one of the most difficult and serious of operations, but it could no longer be looked upon in that light. That fact had been illustrated by Dr. Elsberg as well as by his own work, which embraced some fifty or sixty cases with only two or three deaths. One of these fatalities was from septic pneumonia which was indirectly due to the operation. After an operation of this kind, the patient was seldom, if ever, in a worse condition than before, and the chances of improvement, whether one found a tumor or not, were very promising. He had seen cases of total paraplegia, dependent, apparently, solely upon an intense congestion of the cord, entirely clear up after an exploratory operation. Such an operation, the speaker thought, should be done much more frequently than it was at present. In one case of tumor involving from the eighth cervical to the first dorsal level, the growth was found to be extradural, and was removed. It was submitted to Dr. James Ewing, who pronounced it malignant Hodgkin's disease, and said that in this location it was never primary. In verification of this statement, Hodgkin's enlargement of the glands in the neck developed shortly afterwards.

Dr. Elsberg, in closing, said that excluding operations for fracture up to recently, he had an unbroken series of 61 laminectomies without a death.

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

Stated meeting, held March 2, 1914

DR. JOHN H. GIBBON, President, in the Chair

BONE TRANSPLANTATION (ALBEE OPERATION) FOR SPINAL TUBERCULOSIS

DR. JAMES K. YOUNG reported the following cases:

CASE I.—David S., aged twenty, male, born in Russia, was admitted to the Polyclinic Hospital, November 21, 1913, suffering from tuberculosis of the spine in the lumbar region.

Previous History.—Two years ago while at work in the country, in Russia, he was injured by being thrown against a door and striking his back, was confined to bed for one week, and worked one week, when he noticed the bone projected backward; he was advised by a physician to have an apparatus applied, but refused. The deformity increased and he was unable to work.

Present Condition.—On admission there was marked kyphosis in the lumbar region, including the first and fourth lumbar vertebræ, with deferred pain and weakness, but no paraplegia. On November 22 Dr. Young did a bone transplantation operation, taking the graft from his left tibia. The convalescence was uneventful. He wore a plaster case ten weeks and has since worn a brace. The symptoms disappeared and the spine is ankylosed.

CASE II.—John B., colored, male, aged twenty-four, was referred to the Polyclinic Hospital by Dr. David Reisman. In addition to a tubercular lesion of one of his pulmonary apices he had a well defined tubercular kyphosis in the dorsal region. The usual signs of pressure, pain and muscular spasm were present, but no paraplegia. On June 18, 1913, was done a bone transplantation operation, taking the graft from his tibia; a plaster-of-Paris cast was worn for seven weeks. There was nothing unusual in the convalescence and a fixation of his spine caused an improvement in his symptoms. Upon removing the

cast he was not entirely free from symptoms and a spine brace has since been worn. The spinal lesion appears to have been arrested.

CASE III.—Rose L., Russian Hebrew girl, aged nineteen years. Was admitted to the Polyclinic Hospital December 12, 1912, for dorsal Pott's disease with paraplegia. She had had the deformity for eight years, part of which time she had worn a spine brace and head piece. She was without any efficient support most of the time. The kyphosis was angular and large, including the fourth to ninth dorsal vertebræ. There was loss of patella reflexes, marked ankleclonus with marked motor palsy of the lower extremities. She was very anæmic and weak, but there was no suppuration nor amyloid disease of any of the internal viscera. On December 13 bone transplantation, using a graft from the tibia, modeled to fit the curve. During convalescence the wound in the leg attracted her attention more than the spinal incision. She was in bed four months in a plaster case, since which time she has worn no support, her paralysis has disappeared and her spine is ankylosed.

The technic of Dr. Young does not differ from that of the inventor Albee, except in a few non-essentials. A curved incision is made in the dorsum on the right side and the left side of the spinous processes is separated with a chisel. This insures a good covering over the spinous processes and prevents gaping of the wound. Kangaroo tendon sutures are used in the fascia, the bone from the tibia is removed with an osteotome, and by team work of the assistants the time of the operation is diminished: the Resident Surgeon assists while the spine is prepared, the graft being removed by the first assistant with the aid of a second assistant. Then the first assistant takes the place of the Resident and holds the bone in place while the wound is closed. A support should be worn until the akylosed spine can support the weight of the body, at least 9 to 12 months. In selected cases the recovery seems to be more rapid from earlier ankylosis. It should not be performed in children under eight, in incipient cases without deformity, or where efficient apparatus can be worn.

An abscess or discharging sinus in the region of the incision would complicate the operation. Amyloid disease would not be a contra-indication, but would render the ultimate prognosis less favorable.

DR. J. TORRANCE RUGH said that he would not make the age limit quite the same as did Dr. Young. He believed the operation to be especially indicated after the twelfth or fourteenth year, and for the

older class of patients it is the ideal operation. There is one feature of the operation which, however, has brought rather disastrous results in a certain number of cases, and that is that the graft is made too short. It does not extend a sufficient distance above and below the site of disease to give a firm hold and a firm support, and the cases which have done badly and where the deformity seems to have recurred, have been due to that fact.

The method, as shown by Albee, is to expose the spine, prepare the site for the insertion of the graft, and then measure the length of graft desired and take it from the leg. It would be difficult to gauge the exact length of the graft needed unless the area for the insert has already been exposed.

In the younger cases, under twelve years, the Hibbs' operation has a distinct place. This consists in the utilization of the spinous processes for securing a bridge of bone along the posterior column. In a case in which a total paralysis had been present for eight months this disappeared absolutely in about two months after a Hibbs' operation and the patient is now walking about with practically no support and with a good firm spine. The Hibbs' operation is very easy in the child but difficult in the adult.

Dr. James K. Young (in closing) said, in regard to the size of the graft, he used a wooden sterile tongue depressor on which he measured the vertebræ, and his assistant was then able to take out the part marked while he was preparing the spine for its insertion. The operation is easily performed in twenty minutes. He had found the osteotome better than the electric saw.

There is no age limit, but the shock is less after eight years of age.

He takes the periosteum with the transplant, and Dr. Albee suggested always scarifying the transplant in the longitudinal direction, while Dr. Galloway suggested scarifying it in the opposite direction, so he scarified it in both directions so that the osteogenetic layer of the periosteum of the graft will unite with the bone of the vertebræ.

A TREATMENT OF OLD CONTRACTED CICATRICES

Dr. Emory G. Alexander presented a paper with the above title, for which see page 450.

Dr. James K. Young said, in rgard to fibrolysin, he had had some experience with its administration, and had found it could be used quite extensively. He had given one patient 94 injections without any bad effects. The drug is often tasted in the mouth, so that evidently it goes through the body, and in arthritis deformans it has a peculiarly

happy effect on the joints, as the ankle, knee, wrists, etc. He called attention to a treatment by Parker, of Chicago, for the prevention of scars after burns. He showed several patients he had treated by strapping with zinc oxide plaster and fixing the parts in plaster-of-Paris splints. This plaster was removed at intervals, and by keeping the elbow, axilla, and groin straight and fixed, contractures did not occur in the patients shown.

Dr. J. Torrance Rugh said that he had had some experience with the use of fibrolysin. He had the privilege of seeing one of Mr. Tubby's cases last summer and in that case Mr. Tubby did not dissect out the scar tissue in Dupuytren's contraction, but simply scarified the parts and rubbed in the fibrolysin, and the result was a most satisfactory one and there was complete correction of the contraction.

Quite some years ago, following an operation on the heel tendons, a rough callus developed over the site of the scars. He gave thiosinamine by mouth for three months and secured absorption of the scars, the tissue becoming soft like the other skin. Recently in a similar case, he injected fibrolysin in the patient with the same type of result, absorption of the redundant scar and a perfectly normal skin over the top of the old thickened hardened scar.

In a case of congenital Dupuytren's contraction in the fingers in a girl of 13 he used perhaps six injections of fibrolysin, and since then had had the finger on a splint for the purpose of firm extension. The only effect of the fibrolysin observed in this case has been a marked softening of the tissue. It has not now the density which it had before he made the injections, but he was having difficulty in extending the finger because of the contraction of the ligaments on the palmar surface of the joint.

Dr. L. H. Mutschler said that he was called at 5 o'clock in the morning to see a man, about sixty years of age, who had been suffering for a number of months with articular rheumatism. He had had one injection of fibrolysin the afternoon before. He had had a collapse, became short of breath, perspired profusely and everyone thought he was going to die; he seemed to have recovered somewhat by the time he was seen by Dr. Mutschler, being in fairly good shape though still a little delirious. The next day his physician gave him fibrolysin again in half the amount of the first dose, and the patient again became delirious. The last heard of him he had a nurse taking care of him. He had never had any such attack previous to this treatment.

Dr. Emory G. Alexander (in closing) said, with regard to the effects of fibrolysin, there were no bad results in the administration of the drug in the case of the patient reported, and he had also noticed

in the literature that many people recommend giving it intravenously. They claim it produces a nauseating effect sometimes but aside from that he knows of no ill effects at all.

This boy's arm had completely healed when he was again injected a week ago, which has caused the breaking down at the elbow which he exhibits at present.

Dr. A. W. Tucker (by invitation) presented "Some Experiences in Surgical Practice in the Orient."

OBLIQUE SUBTROCHANTERIC FRACTURE OF FEMUR

Dr. Louis H. Mutschler reported this case, not because it is of an unusual nature or of rare occurrence, but to show the excellent results that may be obtained by the open treatment of fractures in contrast to those obtained by the older methods. This woman, 35 years of age, was admitted to the Episcopal Hospital, May 29, 1913.

While attempting to alight from a wagon her skirt caught and she fell to the ground, striking her right hip. She was unable to stand and was brought to the hospital. She was poorly nourished, anæmic in appearance and extremely nervous. She complained of pain in the region of the right hip; the right foot was everted, crepitus and preternatural mobility were felt just below the joint. The right extremity was one and a half inches shorter than the left. A fracture of the upper third of the femur was diagnosed.

Treatment: a Buck's extension with weights was applied and a sand bag placed on each side of the limb. An X-ray picture was taken a few days after admission, and showed an oblique subtrochanteric fracture of the right femur.

The deformity was typical of this kind of a fracture. As is shown in Fig. 1, there was marked displacement; the upper fragment was abducted and tilted forward; the lower fragment was adducted and overlapping the upper fragment to the extent of about one and one-half inches. The line of fracture was oblique from above downward and outward, this being the usual line of direction of fractures in this location.

On June 8 an attempt was made, under chloroform anæsthesia, to reduce the fracture and the limb was again placed between sand bags, in an elevated, abducted position, with twenty pounds of extension.

A second X-ray picture, taken four days later, showed the fragments to be in about the same displaced position. He had considerable difficulty in persuading the patient to consent to an operation. After several days, however, she decided to undergo an operation and it was

FIG. 1.—Subtrochanteric fracture of femur with displacement.

FIG. 2.—Fracture plated and wired.

done under ether anæsthesia on June 13, fifteen days after the accident.

An incision, about seven inches in length, was made on the outer side of the thigh over the seat of fracture. After exposing and freeing the ends of the fragments from soft tissues he had great difficulty in reducing and holding the fragments in proper position. A Sherman plate with two screws into each fragment held them in place, and, as an extra precaution, he placed a silver wire around the ends of the fragments and over the plate at right angle to the line of fracture. The wound was then closed and a small gauze wick inserted for drainage. The limb was placed between sand bags with light extension.

The wick was removed the third day and the patient made an uneventful recovery. She was permitted to get out of bed after a period of nine weeks and left the hospital walking with the aid of crutches.

Her limb was in good position and each lower extremity measured thirty-five inches when discharged (see Fig. 2). He saw this woman on December 12, 1913, and she was walking about without the aid of crutch or cane. She was attending to her usual housework and went up and down stairs normally. There was no difference in the length of the lower extremities and, with the exception of some slight soreness in the thigh during damp weather, she said she felt perfectly well.

Subtrochanteric fractures of the femur may occur at any age, but are uncommon. Articles describing fractures of the femur, just below the trochanter major and minor, are found among the writings of a hundred years ago. It is interesting to note in this literature how carefully fractures of this nature were studied and described and how accurate are the drawings made from post-mortem specimens. These writers dwell at length upon the marked displacement and resulting deformity and the difficulty encountered in attempts to reduce and maintain the fragments in proper position.

Sir Astley Cooper says: "The thigh-bone is sometimes broken just below the trochanter major and minor; it is a difficult accident to manage and miserable distortion is the consequence if it be ill treated."

To quote Amesbury: "When the fracture is just below the trochanter minor the retraction is sometimes not less than seven or eight inches." This amount of shortening is excessive and probably is seldom seen.

Malgaigne, after fully describing his method of treatment of the type of fracture under consideration, says: "And even with all this, success is very difficult to obtain." The foregoing quotations give a

good idea of the discouragement the early surgeons encountered in treating fractures immediately below the trochanters.

You could not expect, however, these surgeons to obtain better results if the surgeon of to-day, even with the assistance of the X-ray, is usually unable to obtain satisfactory results without resorting to the open treatment. By so recent and able an authority as Scudder we are told that treatment of subtrochanteric fractures by extension and counterextension and the use of the inclined plane are usually ineffective.

The displacement of the upper fragment is due to the action of the iliopsoas and to the rotators fastened to this portion and the retraction and adduction of the lower fragment to the strong muscular contraction of the adductors, probably caused in part by the irritation of the sharp end of the fractured bone. The early treatment of fixation of the pelvis, extension with counterextension, abduction, placing the thigh on an inclined plane, immobilization, etc., has continued with little or no modification up to the present time.

Much has been learned concerning fractures since the discovery of the Röntgen rays. Diagnoses of fracture have been made only to be reversed by the skiagraph. More frequently fractures have not been diagnosed and later have been demonstrated by the X-ray. It is by this means alone that we can positively tell the kind of fracture and the true position of the fragments. It is of the utmost importance, when possible, to have X-ray pictures taken in planes at right angles to each other, otherwise the true deformity is not always shown.

In many cases in which the fragments have united and resulted in good normal function of the part, the skiagraph has revealed the existence of a decided deformity.

The recent interest in and the progress that has been made in what is known as the open treatment of fractures with proper replacement and fixation of the fragments by one of the several methods have been the means of obtaining infinitely better results. The principal objection to the operative treatment is the fear of infection.

If in these days of advanced aseptic surgery we are not reluctant to open the peritoneal or cerebrospinal cavity, why should we hesitate to cut down upon a fractured bone? The X-ray will show the fragments to be in good position in many cases of fracture and obviously no operation is indicated. In those cases, however, with marked and obstinate deformity, like the one under consideration, he believed the open treatment should always be employed, providing the patient's condition permits.

BOOK REVIEWS

SURGERY. ITS PRINCIPLES AND PRACTICE. For students and practitioners. By ASTLEY PASTON COOPER ASHHURST, A.B., M.D., F.A.C.S., Instructor in Surgery in the University of Pennsylvania, Associate Surgeon to the Episcopal Hospital, and Assistant Surgeon to the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases. 1141 pages, 7 colored plates and 1032 illustrations in the text. Philadelphia and New York: Lea and Febiger, 1914.

THE entire field of the principles and practice of surgery is amply covered in this book with the exception of the specialties of the eye, ear, nose and throat. Genito-urinary surgery, gynæcology and orthopædics have been referred to only in so far as the author believes them to come within the province of general surgery. Emphasis has been placed on the underlying principles of surgery and pathogenesis, diagnosis and indications for treatment are well worked out. In a book of this size it is easily understood it is not possible to describe all methods of treatment, or even all of the better methods of treatment; however, the author has made a wise selection, though here and there there is room for difference of opinion as, for example, in the operation for cleft palate, the operation of Lane not being described. The author's style for the most part is admirable. The illustrations are excellent, for the most part original, and complement the text admirably. The author has carried out his purpose, as expressed in the preface, to furnish a foundation on which a knowledge of surgery may be built. It is intended primarily as a text-book for students and as such fulfils its purpose and is to be recommended.

RUSSELL S. FOWLER.

PRINCIPLES OF SURGERY. By W. A. BRYAN, A.M., M.D., Professor of Surgery and Clinical Surgery at Vanderbilt University. Octavo, 677 pages with 224 original illustrations. Philadelphia and London: W. B. Saunders Company, 1913.

THIS book is not intended for a book of reference but should be read during moments of leisure and time taken to thoroughly assimilate its contents. It will be most valuable to the undergraduate student.

The author has endeavored to teach in a simple and logical way some of the basic principles of physiology, anatomy, pathology and

surgery that are essential to a thorough understanding of disease, in its many forms, as seen by the surgeon, and that govern all successful efforts at relief.

There are forty-seven chapters, each dealing with some particular phase of surgery, such as inflammation, sepsis, shock, anæsthesia, tumors, etc.

There is a comprehensive description of vaccines and their uses.

Bone grafting has a place of its own following skin grafting. The principles laid down are strictly in accord with the most recent experimental work. This section well illustrates the fact that a knowledge of nature's laws and painstaking care brings success, while ignorance and carelessness are synonymous with failure.

The emphasis and detail used in elaborating the non-operative treatment of tuberculosis, especially the general treatment, minute directions for the use of tuberculin, and heliotherapy deserve especial commendation; but some would criticize the interchangeable way in which "tubercular" and "tuberculous" are used.

There is a careful description of the diseases caused by fungi, sporotrichosis, actinomycosis, and blastomycosis.

In speaking of shock all debatable points are avoided and only the commonly recognized factors are dealt with.

The Meltzer and Auer and the Elsberg apparatus are recommended for use in respiratory failure, but the simpler pulmotor or lung motor is not mentioned.

One-third of the book is devoted to a discussion of tumors, the following outline being used, in a general way: Classification, etiology, minute structure, sites of formation, diagnosis, special symptoms in various organs, prognosis, and treatment.

By a curious coincidence sarcoma and cancer each have 58 pages. Here the author has drawn most largely on personal experience and this portion of the book is replete with valuable information covering all the phases of the subject and enriched by excellent X-ray pictures and unusually good microphotographs.

The classification of cysts is an elaborate one.

There is a good working index.

This book, like a road map, points out the beaten highways and leaves the by-paths and forest trails of surgery for further individual exploration.

HENRY F. GRAHAM.

CORRESPONDENCE

A PARAMEDIAN CŒLIOTOMY INCISION

To the Editor of the Annals of Surgery:

The retrorectus laparotomy incision, described by Dr. John J. Moorehead in the Annals of Surgery, December, 1913, p. 828, has the grave defect of interfering with the nerve supply of the rectus muscle, and, in the event of the incision requiring extension upward and downward to nearly the whole length of the abdomen, the rectus will have most of its nerve supply cut off.

This interference with the nerve supply, being avoidable, is unnecessary.

The following method of paramedian cœliotomy, which I have employed for many years, has no claim to originality, but possesses the advantages of (*a*) preserving the nerve supply to the rectus; (*b*) being capable of extension, either upward or downward, without injury to nerves; (*c*) producing a solid cicatrix.

The steps of the operation are: 1. A vertical skin incision, one and a half inches from (and usually to the right of) the middle line. 2. Incision of the anterior rectal sheath, in the line of the skin incision. 3. The rectus muscle is peeled off the posterior sheath and peritoneum, from the middle line outward, and is held outward with retractors. 4. Incision of the posterior rectal sheath (where present) and peritoneum, in the line of the skin incision.

The incision is closed by (1) a continuous suture for the peritoneum and posterior sheath. (2) With tissue-forceps on the inner edge of the displaced rectus, this muscle is drawn inward into its natural position, while a series of interrupted mass sutures are inserted, one and a half inches apart. Each mass suture passes through the skin one inch to the right of the skin incision, through the anterior rectus sheath and rectus muscle. It then picks up the sutured line of posterior sheath and peritoneum and, crossing the depth of the wound, enters the left rectus muscle enclosed in its sheath and emerges from the skin one inch to the left of the skin incision. (3) The free (inner) edge of the displaced rectus muscle is attached by a continuous suture to the sheath of the opposite rectus. (4) A continuous suture closes the incision in the anterior rectus sheath. (5) The skin incision is closed with either Michel's clips or a continuous suture which may be either subcuticular

or through-and-through. (6) The mass sutures are tied, *almost loosely*, the object of these sutures being, not to draw the parts together, but to prevent opening of the wound by severe and repeated straining or by increased intra-abdominal tension.

The mass sutures are either stout silkworm gut or paragut (a substance resembling Japanese silk and practically unbreakable). All buried sutures are of catgut, hardened to last at least fourteen days. For through-and-through skin suture, linen thread is employed.

C. HAMILTON WHITEFORD, M.R.C.S.

Plymouth, England.

THE RED STIPPLING SIGN OF GASTRIC AND DUODENAL ULCER

TO THE EDITOR OF THE ANNALS OF SURGERY:

It is often difficult for the surgeon at the time of operation for chronic gastric and duodenal ulcer to determine whether the indurated mass felt in the stomach or duodenal wall is the induration of benign ulcer or whether it is the induration associated with the ulceration of malignant disease.

Any sign which helps to throw light upon this difficulty is important. Since August, 1911, I have noticed that if the peritoneal surface over the ulcer base and its immediate vicinity is gently stroked with the rubber glove or with a bit of soft gauze sponge, almost immediately there is an appearance of little minute red points irregularly distributed over the area thus traumatized. I have called this the red stippling. There is no bleeding from this surface following light trauma.

This local red stippling has been observed by me in cases of chronic ulcer of the duodenum and stomach. Its occurrence has been noted by my associates in the surgical clinic so that the observation has been confirmed. I simply place upon record and would call attention to this appearance that those having opportunity to determine its occurrence may assist further in interpreting its significance.

This red stippling associated with chronic ulcer may be of considerable importance, possibly a helpful sign in determining ulcer from cancer. It may be definitely characteristic of ulcer. It is pretty constantly present.

The accompanying drawing illustrates as well as can be shown in a drawing the appearance of this sign.

CHARLES L. SCUDDER.

Boston, Mass., April 6, 1914.

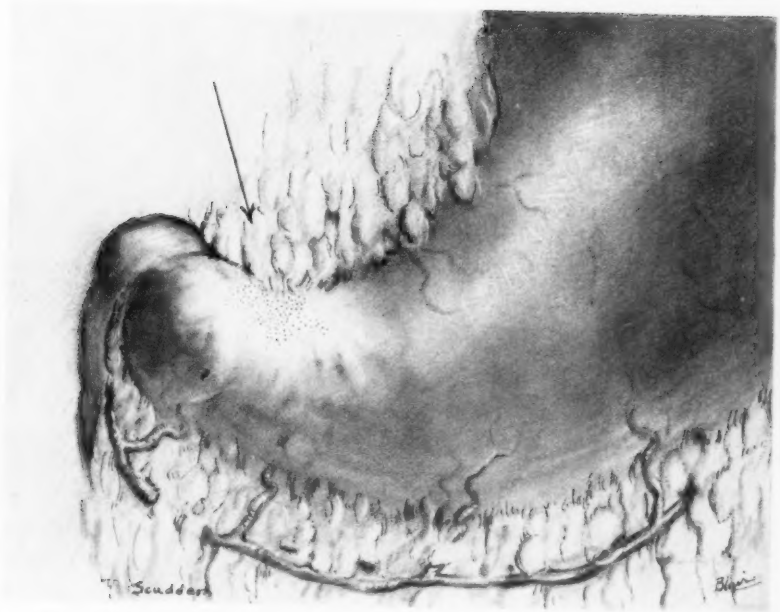

FIG. 1.—A drawing of the pyloric end of the stomach. Note the indurated white area on the lesser curvature near the pylorus and in its centre, pointed at by the arrow. Note the fine stippling occasioned by rubbing the peritoneal surface with gauze.

TREATMENT OF THORACIC ANEURISM WITH POTASSIUM IODIDE

EDITOR ANNALS OF SURGERY:

Allow me to place on record now the following brief reference. The case was reported at the meeting of the New York Surgical Society of November 26, 1913 (ANN. SURG., March, 1914, 462) and will be given in detail in the paper on the treatment of thoracic aneurism, which I read before the Society at that time.

The patient had been referred to me by Dr. C. D. Van Wagenen, who had shown the case just one year before at the Academy of Medicine, as one of left vocal cord paralysis due to aneurism of the aortic arch. Last September on examining the patient for the first time, he could find no physical signs indicating the presence of aneurism. A comparison of an X-ray picture taken in October, 1913, with one taken in June, 1912, at Bellevue Hospital by Dr. Hirsch, both at the same focus and in the same position, showed a shrinkage of from 1 to 1¼ inches in the transverse diameter of the aneurismal shadow to have taken place in the 16 months' time. A transverse X-ray of the thorax likewise showed at the present time a wide, clear space between the shadow of the aortic arch and the sternum. The patient had entirely recovered from his vocal cord paralysis in the spring of the present year. In the 16 months between the taking of the two X-rays he had had potassium iodide in 5 and 10 grain doses three times a day at intervals, for a total of about 23 weeks, besides 9 injections of salicylate of mercury gr. ss. He had also had some potassium iodide in small doses prior to this time.

WILLIAM C. LUSK, M.D.

New York, March 31, 1914.

AN EVACUATOR FOR THE REMOVAL, DURING OPERATION, OF FLUIDS FROM THE ABDOMINAL AND OTHER CAVITIES

EDITOR ANNALS OF SURGERY:

Twelve years' experience of the below-described instrument having confirmed its usefulness, I beg to submit the following description:

In 1909, Kenyon and Pool described (*Surg., Gynec. and Obstet.*, December, 1909) an instrument made on similar principles, but of different form.

In 1911, Koch (Groningen) described (*Brit. Med. Journ.*, October 28, 1911, p. 1070) an evacuator almost identical with the following. Pool has also recently described his instrument (ANNALS OF SURGERY, October, 1913, 537).

The evacuator, made at my request by a manufacturer of Leeds, consists of two hollow metal tubes, the size of a No. 12 Silver Catheter, the tubes lying side by side, and united to each other for the greater part of their length. Both tubes screw into a hollow metal globe, one inch in diameter, which is freely perforated everywhere except at its lower pole. The longer tube, through which the fluid is sucked, reaches to within ⅛ inch of the bottom of the globe. The shorter tube penetrates only to the upper part of the globe, and connects the interior of the globe with the air and thus prevents a negative pressure within the globe, which might lead to bits of omentum or other soft tissues being sucked through the perforations. The outer end of the shorter tube has a removable plug. By inserting this plug and injecting lotion down the longer tube the instrument can be converted into an irrigator. Six feet of stout walled rubber tubing connect the longer tube with the cork of a glass bottle, to which is also attached a shorter length of rubber tubing which, for use in a hospital, leads to a suction apparatus, similar to that employed by dentists, fitted to a water tap on the main. For use in private, the suction apparatus is composed of a reversed enema syringe, which is worked by a nurse. With the globe of the evacuator immersed in a pool of fluid, the fluid trickles through the perforations to the bottom of the bulb where it lies in contact with the end of the longer tube through which the fluid is sucked out.

C. HAMILTON WHITEFORD.

Plymouth, England.

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Remittances for Subscriptions and Advertising and all business communications should be addressed to the

ANNALS *of* SURGERY
227-231 S. 6th Street
Philadelphia, Penna.